9 SEPTEMBER 1954 NINEPENCE

ELECTRICAL TIMES

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(TYPE WR)

FOR SINGLE-STAGE CONTROL

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- Selector switch to give automatic or manual control as required.

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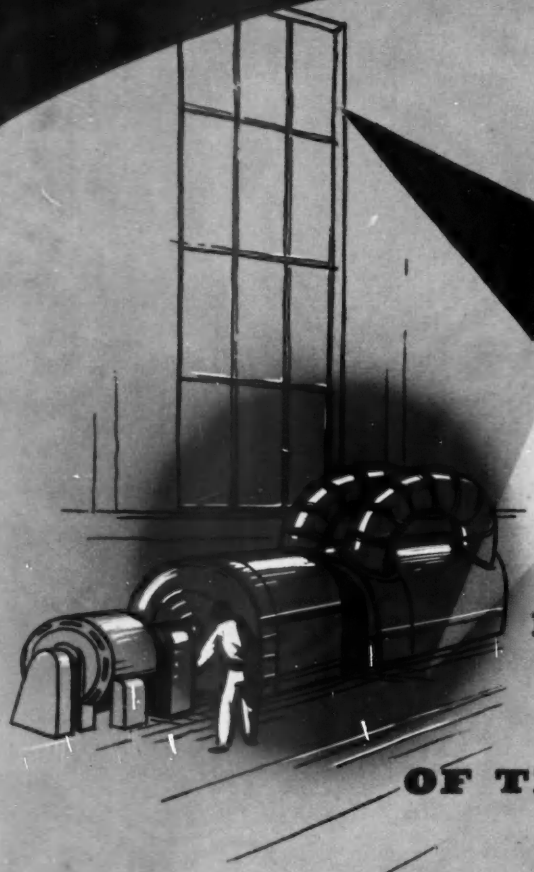

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- *Coopers Felt serves the industry in many ways*
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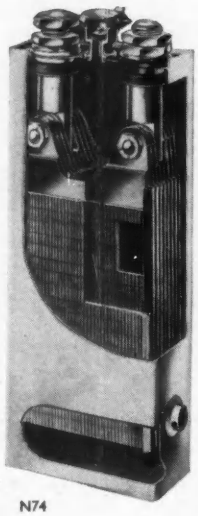
TELECOMMUNICATIONS

They're tough! they're dependable!



Made of steel—containers and plates—a Nife battery has great mechanical and electrical strength and is unaffected by vibration and shock. A Nife battery withstands the heaviest discharge. It is free from self-discharge and is unaffected by idleness in any state of charge. All this means a battery of long life and low maintenance—the ideal battery for all industrial uses.

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Smiths Hand Tachometers are amongst the most versatile instruments ever made available to industry. They indicate rotational speeds or surface speeds, indicate any fluctuation of speed and any particular reading can be observed simply by pressing a button before disengaging from the point of drive. The illustration shows a Smiths Hand Tachometer in use in the Cutting Tool Development Department of the English Steel Corporation Ltd., Openshaw, Manchester. In this instance the instrument is indicating surface speed of a test bar during a turning tool investigation. May we send you full particulars of this most valuable range of instruments.

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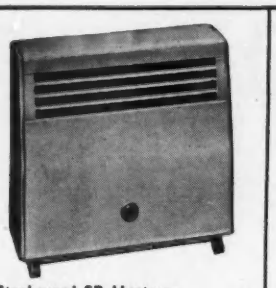
188/248

Autumn winds bring **Thermovent** *sales!*

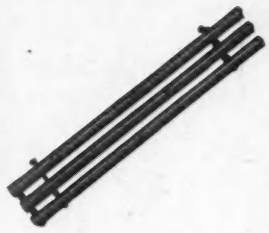
DELIVERY FROM STOCK *NOW!*



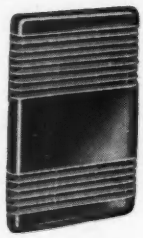
Steel-cased SR Heaters
Handsome floor-standing type with metal case finished in light bronze enamel, fitted with luminous effect. Available in 1, 2 and 3 Kw loadings with or without Automatic Heat Control. From **£8.17.7**

1 Kw FR Heater
Floor-standing model with walnut finish plastic front panel and warm luminous effect behind 'old gold' metal grilles. With or without Automatic Heat Control. **From £9.11.3**

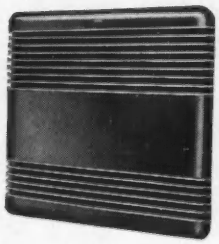
2 Kw FR Heater
Larger version of the attractively styled floor-standing heater. Available with or without Automatic Heat Control. From **£14.6.10**



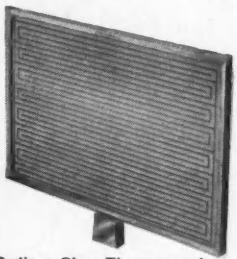
Thermotubes
Tubular heaters in lengths from 2ft. to 12ft. giving a flexibility of installation to meet the most difficult heating problems. From **£1.6.6**
Waterproof types also available.



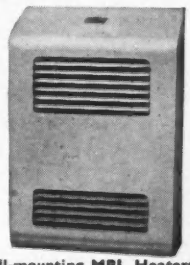
1 Kw Inset Heater
Inset type heater for building into walls and furniture. Front panels in walnut plastic, with grilles coloured 'old gold.' With or without Automatic Heat Control. From **£10.4.11**



2 Kw Inset Heater
Attractively styled 2 Kw version of the Inset type for large area heating. Available with or without Automatic Heat Control. From **£14.13.8**



Radiant Glass Thermopanels
Wall-mounted heaters for rapid local heating. 750w and 1 Kw loadings in two types: type RG for industrial applications, type RGF with wall frame for use where appearance is important. From **£8.17.7**



Wall-mounting MRL Heaters
Robustly constructed of welded sheet steel for compact wall-mounting. Ideal for all applications where floor space must be kept clear. Available in 750w, 1 Kw, 1500w and 2 Kw loadings, with or without Thermostat Control. From **£10.4.11**

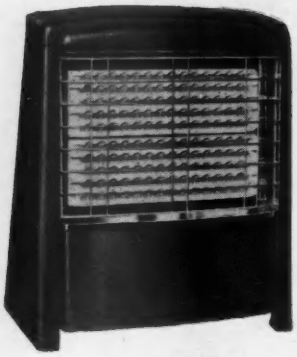
The first cold spells of Autumn send up the demand for Thermovent Heating—NOW is the time to prepare! The widely extended range of Thermovent Heating Equipment includes **high temperature panels, unit heaters** and a range of **thermostats** for every type of installation.
ORDER THERMOVENT HEATING NOW AND CASH IN ON AUTUMN SALES

EKCO **Thermovent** ELECTRIC **COMFORT HEATING**

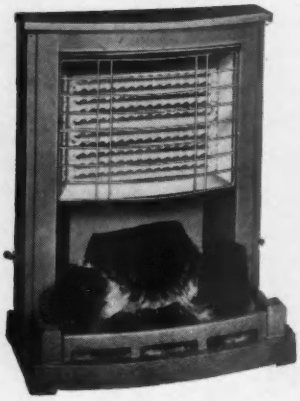
E. K. COLE LTD., 5 VIGO STREET, LONDON, W.1

It's time to stock up!

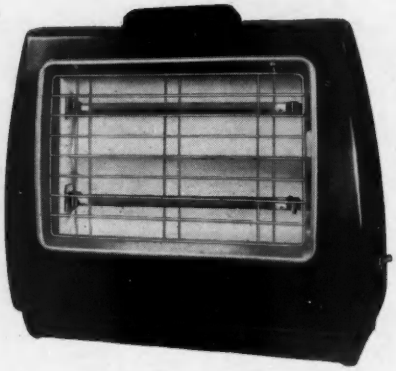
Here are some of our latest heating appliances:



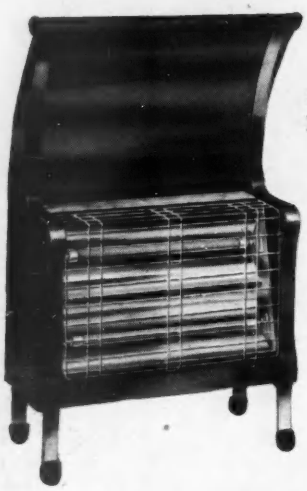
DAINTY
No. 226 2 kW size £6.3.0. inc. tax
Finish: Light Bronze.
No. 226P 2 kW size £7.10.4. inc. tax
Finish: Electro-Plated Bronze.



CHEERY
No. 360 2 kW size £9.11.4. inc. tax
Finish: Silver or Bronze.

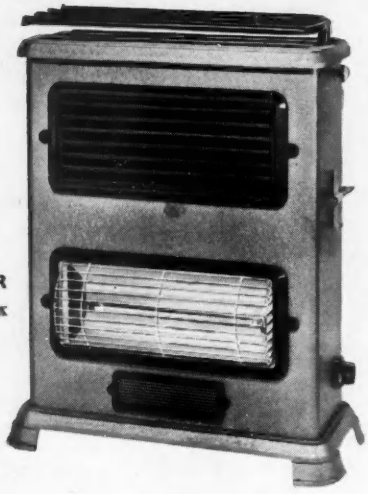


MODERN
No. 228 2 kW size £8.4.0. inc. tax
Finish: Light Bronze.
No. 228P 2 kW size £10.5.0. inc. tax
Finish: Electro-Plated & Light Bronze.



SUNSET
No. 323 2 kW size £13.6.6. inc. tax
Finish: Oxidized Copper.

RADIANT CONVECTOR
No. 750 2 kW size £17.8.6. inc. tax
Finish: Ripple Bronze or Cream.



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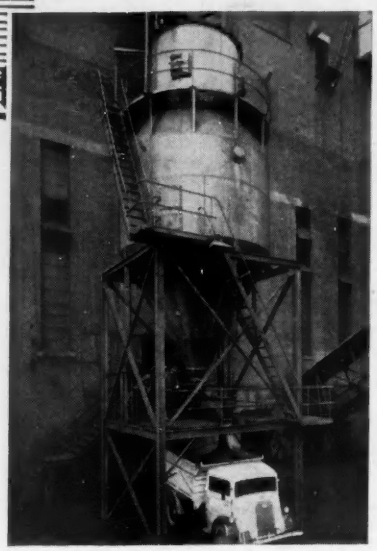
TEL.: SEVEN KINGS 1810 GRAMS: METROCABLE

No. A9

SAVE COST

with - B.V.C



FLUE DUST AND RIDDLINGS

EXTRACTION PLANT

Coal must convert every possible fraction of its energy into power if costs of production are to be kept down. The vital contribution that efficient combustion makes to this end is immeasurably facilitated by B.V.C. Flue Dust Removal Plant. This is the recognised method of keeping steam boilers free from accumulations of flue dust, and ensuring that every ton of coal is used to the best possible advantage by removing and consuming the riddlings.

For Information and Consultation write to Dept. 14F

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LOOK – the light comes down!

Fluorescent Lights are more easily serviced with L.E.F. RAISING and LOWERING GEAR

The obvious] method of reaching inaccessible lights for servicing is to bring them down to where they can be dealt with at ease. Yet ladders and other improvisations are still employed.

L.E.F. Raising and Lowering Gear does the job in much less time and with far greater convenience. It is suitable for use with interior and exterior lighting installations including fluorescent fittings. The photograph shows a fluorescent fitting in the lowered position.

L.E.F. Gear is an economical proposition that deserves your careful consideration. *May we give you a demonstration at our works or send you full particulars.*

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SOUTH CROYDON · SURREY · *Telephone Uplands 4871*

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CLEANS COOKERS

KLEENOFF removes even the hardest baked-on grease without rubbing or scouring.

Retails at 1/- per tin.

Specially designed Kleenoff Mops and Brushes are available.

Sealed by the BRITISH GOOD HOUSEKEEPING INSTITUTE GUARANTEES REFUND OF MONEY OR REPLACEMENT IF NOT IN CONFORMITY WITH THE INSTITUTE'S STANDARDS

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KETTLE DE-SCALER CLEANS KETTLES

The certain way to remove scale. Recommend KAY-DEE for its efficiency and economy. Saves kettles - and cash!

Retails at 2/- per bottle.

These two products are consistently and extensively advertised and both hold the Good Housekeeping Seal of Guarantee.

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in every showroom

It's a positive fact the BURCO Model E950 sells on sight.

Its appearance is appealing, its performance of the highest BURCO tradition—need we say more? When fitted with the BURCO Agitator Unit it becomes a complete Washing Appliance—the finest value today.

Easy to move, yet rigid in use, thanks to its fixed castors. Economical in use and in space, yet is a Family size Washboiler. ***YOU CAN'T BEAT BURCO.***

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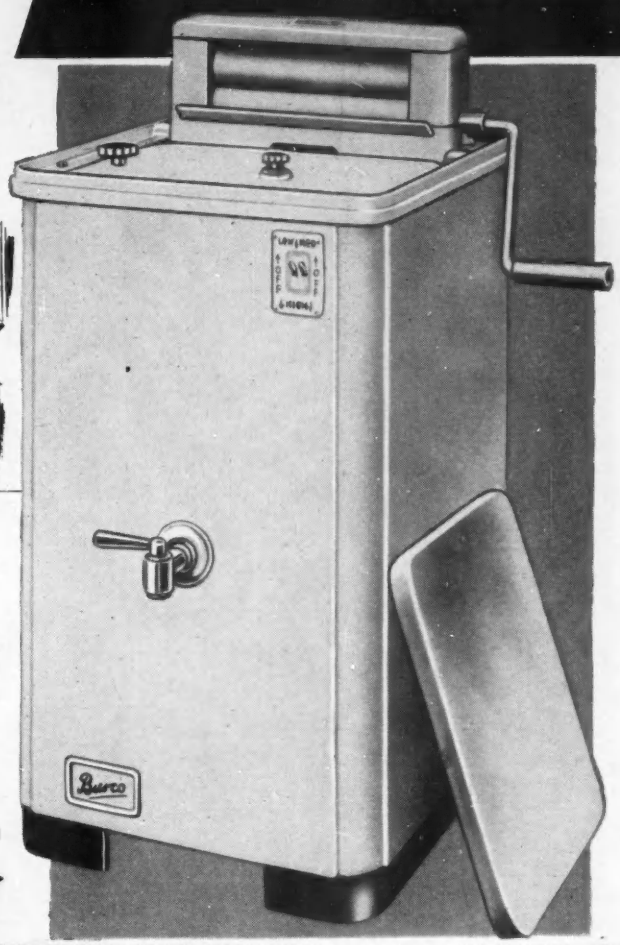
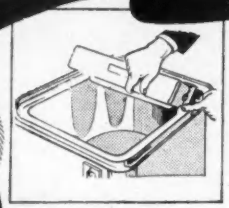
Burco MODEL E950

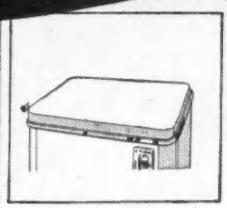
ELECTRIC WASHBOILER WITH FOLDING WRINGER



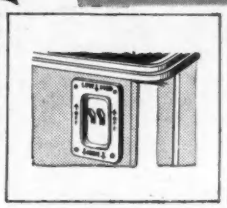
JUST A FEW OF THE BIG SELLING FEATURES



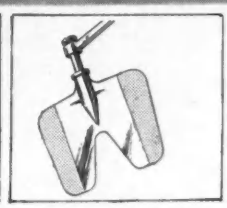
WRINGER STORAGE
The wringer can be swiftly folded inside the container and the enamelled table top makes a useful addition to kitchen equipment.



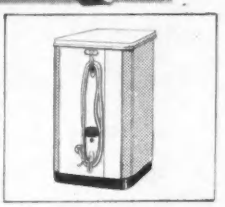
COOL TABLE TOP
of porcelain enamelled steel which enhances the appearance whilst providing additional working space.



SWITCH CONTROL
Remote switch panel of advanced design placed at working level and giving 3-heat control.



BURCO AGITATOR LID UNIT
Specially designed for the E950, it fits easily into position on the existing lid and is remarkably simple to operate.



CABLE HOUSING
There is 5 ft of external 3-core cable which is rapidly stored at the rear of the boiler when not in use.

***PRICE E950AS* £23-5-10**

AGITATOR LID UNIT **£1-15-6**

INCLUDING PURCHASE TAX

***BURCO** Automatic Safety Cut-out £1-0-0 extra*

e.g. ***E950 ASR*** **£24-5-10**

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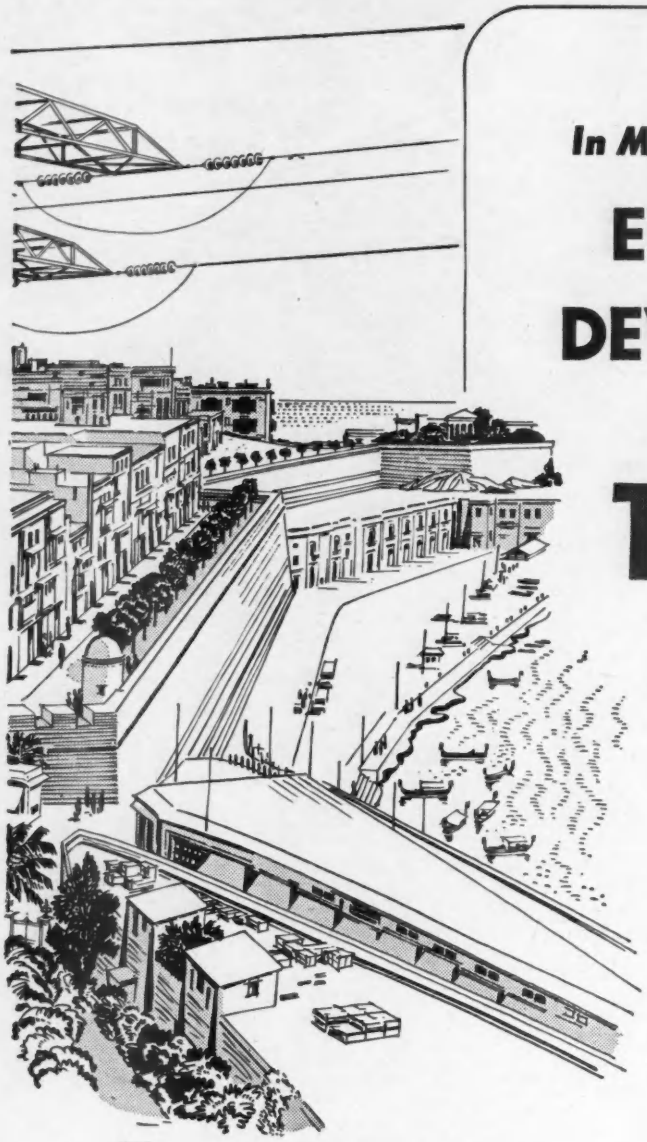
the Aristocrats of electric Washday Appliances

Also makers of the Famous Burco all-electric washing machine



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ELECTRICAL DEVELOPMENT

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Tudor are supplying fifty 30-volt self-contained switch tripping equipments to J. G. Statter & Co. Ltd. to whom the Crown Agents, on behalf of the Malta Government, have awarded the contract for supply of the 11 kV switchgear required for reconstructing the distribution system. The Consulting Engineers are Messrs. Preece, Cardew & Rider.
The reconstruction involves changing from single phase, 100 cycles to 3-phase, 50 cycles which will enable the l.v. system to be standardised at 415/240 volts, 50 cycles.

FOR OVER FIFTY YEARS The Tudor Accumulator Company has specialised in the design and manufacture of batteries for switchgear operation, indication and emergency duties in power stations and substations; and Tudor Batteries have played a large part in the recent expansion of electricity supply in Britain. Wherever they are in service, Tudor Batteries are noted for their outstanding reliability and low maintenance cost under all conditions.

Tudor engineers will be pleased to prepare a specification of the most economical battery scheme to meet your requirements.

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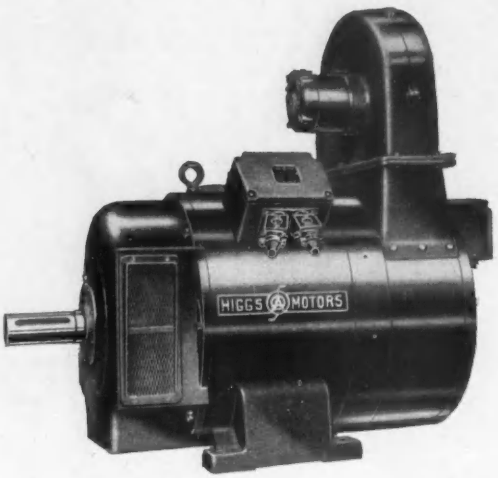

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FINE REGULATION

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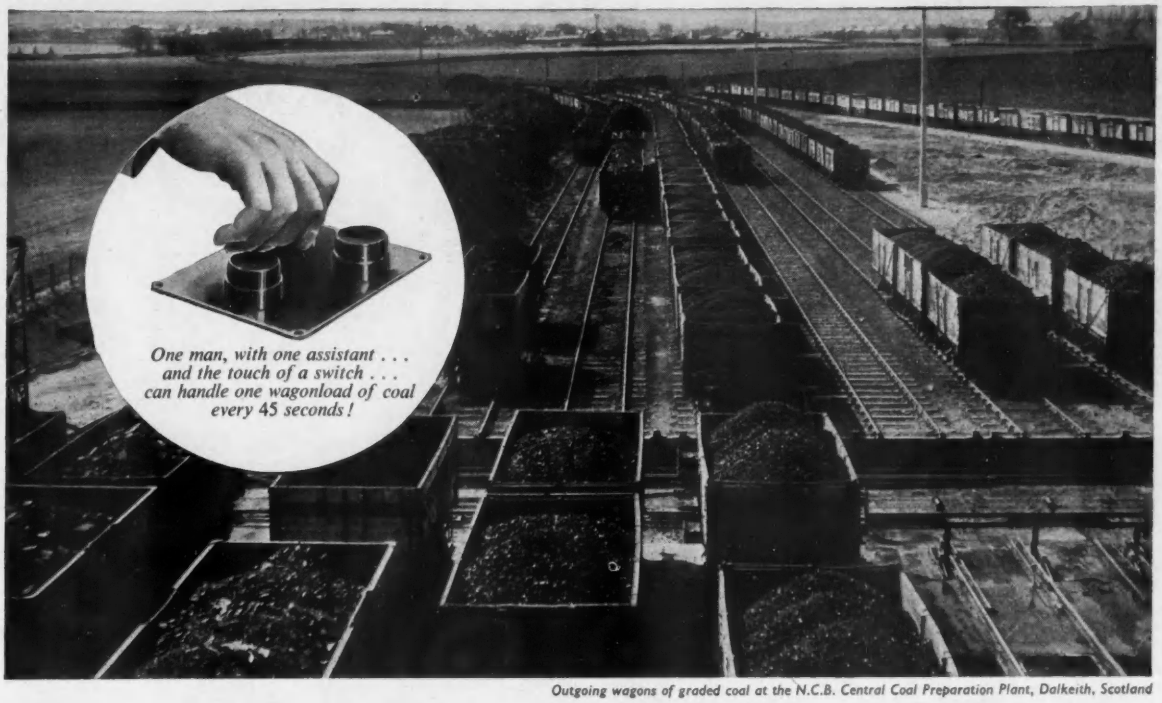


Outgoing wagons of graded coal at the N.C.B. Central Coal Preparation Plant, Dalkeith, Scotland

NEW APPROACH TO WAGON HANDLING

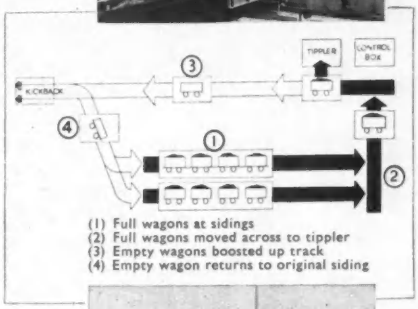
. . . Mitchell system means smaller sidings, quicker turnround, less gear, greater safety

How many men work on your coal sidings? How many locomotives or capstans? What space is wasted by sprawling tracks? How much tonnage can you handle per hour?

The generally unsatisfactory answers given to such questions as these inspired the design of the Mitchell system of wagon handling—a mechanical, electrically-controlled system that offers remarkable scope for increased efficiency at power stations, collieries, coal preparation plants, steelworks, etc., and other centres of industry possessing marshalling yards.

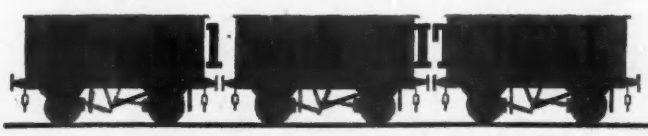
The Mitchell system can be operated by two men. It takes wagons from the arrival sidings, loads or unloads them, weighs them and remarshals ready for departure. Wagons can be emptied and returned to the same siding they arrived at "full" so that one track is used for full and empty wagons. No internal shunting, no additional motive units, no man-handling other than initial uncoupling and final recoupling, are required. The system has no limit to size or capacity and can easily handle the 1000 tons or more of coal per hour which is now being called for. And it does it with the highest degree of safety, in all weathers, round the clock if needs be.

By demanding no more than half the space occupied by traditional balloon sidings, the Mitchell system makes possible the erection of new plant on sites hitherto unsuitable, with very large savings in initial and later costs. Its flexibility makes it adaptable to any individual handling problem. Installations are already at work for the National Coal Board and the British Electricity Authority. The thoroughgoing efficiency and economy of the Mitchell system puts it far in advance of any traditional method and establishes it as the system of the future.



(1) Full wagons at sidings
(2) Full wagons moved across to tippler
(3) Empty wagons boosted up track
(4) Empty wagon returns to original siding

An installation at the British Electricity Authority, Freemens Meadows, Leicester, handling 800 tons of coal an hour. The site is limited in area and normal methods of working with balloon sidings would be impractical. The pictures show the traverser pulling an incoming truck on to the transfer rail and an emptied wagon being returned to the siding by the 'kickback'.



MITCHELL ENGINEERING LIMITED
ONE BEDFORD SQUARE · LONDON · WC1

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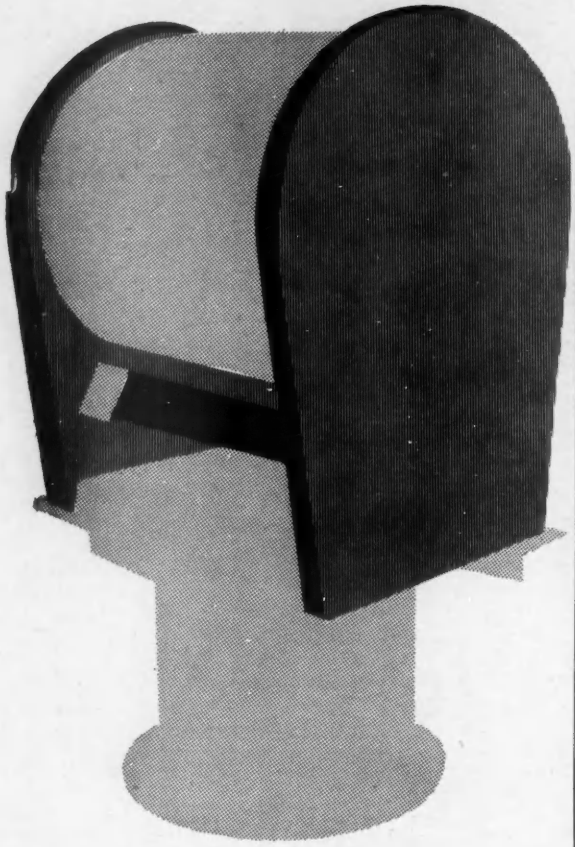

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Light yet sturdily built for constant duty and long life. Easily carried in the pocket. NO glass to break. NO gas to leak.

FULLY PROTECTED AND FUSED.

Is it alive ?

What voltage (up to 600) ?

A.C. or D.C. ?

Which is earth ?

and with absolute safety even on heavily fused conductors.

MARTINDALE ELECTRIC CO. LTD.

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also at 25 ELMBANK STREET, GLASGOW, C.2.

ODDIE FASTENERS

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The FASTENER with ENDLESS APPLICATIONS

SIMPLE — POSITIVE — SELF LOCKING

Made in a variety of types and sizes

SPECIAL FASTENERS TO SUIT CUSTOMERS' REQUIREMENTS

Widely used in the Electrical Industry

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ODDIE, BRADBURY & CULL LTD.

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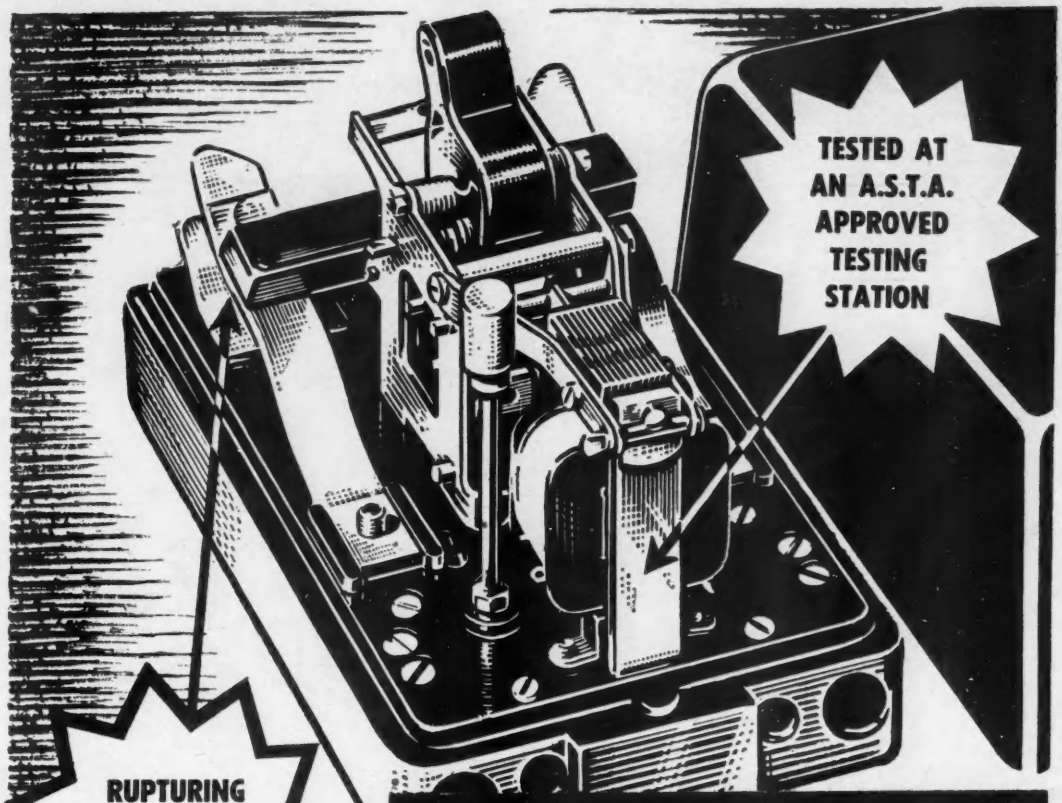
Tel. : 55883 **Cables : Fasteners, Southampton**



CHILTON

Earth Leakage Circuit Breaker

Type ELT/A—(Without overload protection).
A robust Double Pole unit built in full accordance with BS:842:1939. Tripping mechanism designed to give reliable operation even after long periods of inaction. **0 to 60 amps 39/9**

Type ELT/B—(With overload protection).
Certified Rupturing Capacity 2,500 amps 250 V 0.3 power factor. This type, which incorporates both thermal time lag overload protection and instantaneous magnetic short circuit protection, is the least expensive and most efficient combined overload and earth leakage circuit-breaker on the market. **30 amps 52/6** **60 amps 59/6**

Type ELT/MA—(Without overload protection).
A standard type ELT/A unit in robust metal box for especially arduous conditions. **0 to 60 amps 77/-**

CHILTON ELECTRIC PRODUCTS LTD

HUNGERFORD · BERKS · ENGLAND

SUPPLIERS OF ELECTRIC LAMPS THE EDISON SWAN ELECTRIC CO.LTD.

BY APPOINTMENT TO THE LATE KING GEORGE VI

ROYAL

"EDISWAN"

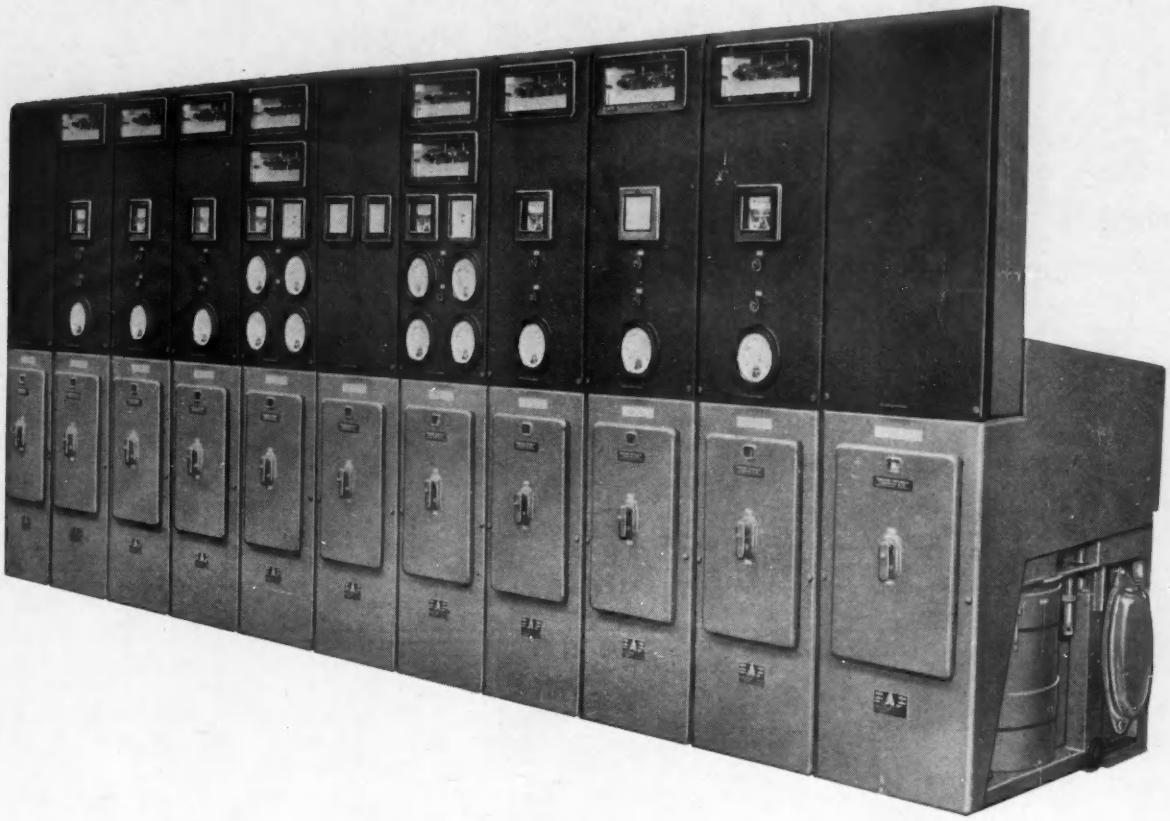
LAMPS

The first name in lamps

THE EDISON SWAN ELECTRIC COMPANY LTD., 155 CHARING CROSS ROAD, LONDON, W.C.2

Member of the A.E.I. Group of Companies. (L.189)

ANOTHER H. T. SWITCHBOARD



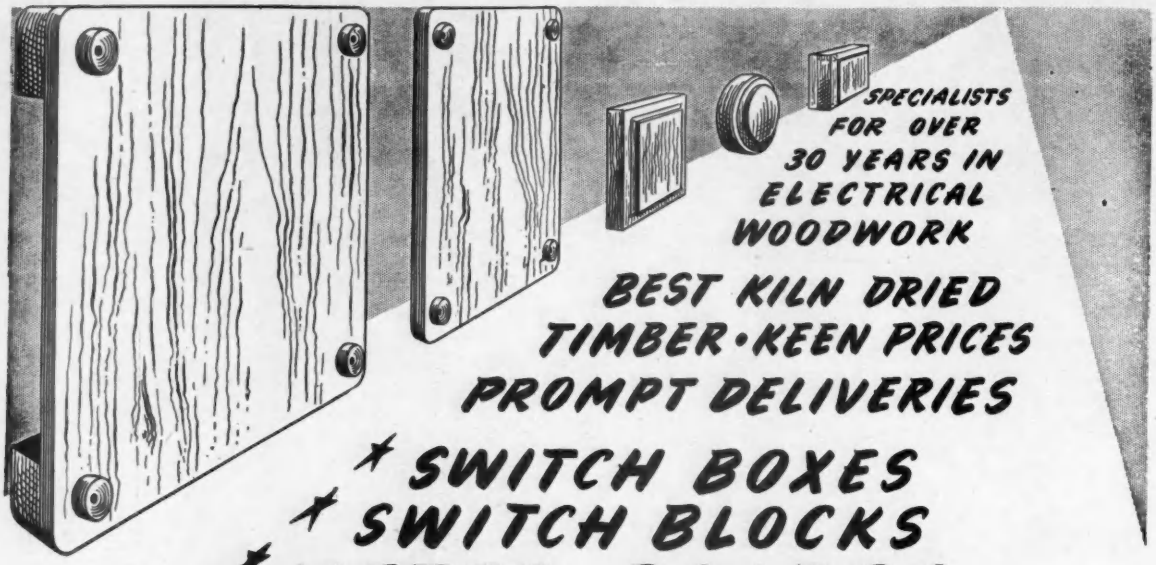
Typical 11 kV 250 MVA IVI switchboard embodying arc trapped circuit breakers for important industrial substation.
Write for Catalogue No. M.C.6/I.
(Also for outdoor use.)

YORKSHIRE SWITCHGEAR

& ENG. CO. LTD.

LEEDS ———— LONDON

Associated with Electro Mechanical Mfg. Co. Ltd., Scarborough



WOOTTON & CO LTD

ALMA WORKS · PONDERS END · MIDDLESEX. TELEPHONE: HOWARD 1858

The odd case of the varnishing medium

It is quite obvious to the meanest intelligence! If my deductions are correct we will discover our medium on such insulations as are enclosed in a metal circuit, eliminating discharges on the slot portion of motor coils and on instrument transformer coils. Yet this varnish medium is but one link in the case, for it holds a pure silk fabric coated with graphite—the whole being known to discerning electricians as Symoid Conducting Tape. Thanks to the valuable pioneer work of our old associate Inspector Symons, I am able to say that, as a flexible conducting material, Symoid can be used in all types of taping operations where a metallic tape would prove too rigid. An ingenious business, sir!

SYMOID CONDUCTING TAPE

Pure silk fabric coated with graphite held in a varnish medium. For all taping operations where metallic tape is too rigid. Resistance value varies linearly with thickness of coating, and will be lowered with ageing. Can be supplied in roll form 36″ wide and as tape either bias or straight cut.

Symons ADVISORY SERVICE

If you have an electrical insulation problem, send it to us! Our experts will be pleased to advise you.

TESTED FLEXIBLE INSULATION BY

H. D. Symons & Co. Ltd.

PARK WORKS · KINGSTON HILL · SURREY

TEL KINGSTON 0091 · GRAMS INSULATION (PHONE) KINGSTON - ON - THAMES

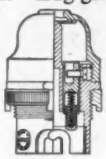
Ashley Regd. B.C. LAMPHOLDERS

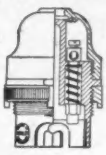
Eight types of "Ashley" B.C. Lampholders, listed in one hundred and thirty-two variations. All are well designed, precision made from the best materials, and quality controlled. Each one is "Ashley" branded, guaranteed, and reasonably priced.

FEATURES. Moulded, or with porcelain interiors. Brown or white. Brass liners. Spring or solid plungers, with non-rust springs. Easily wired terminals. Lug grip shade carrier rings with brown holders. White holders have short shields. Home Office pattern ventilated shields. Excellent finish. Complying B.S. 52.

SPRING PLUNGERS

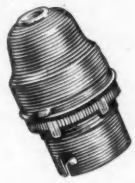
Terminals stationary during lamp insertion or removal.





SOLID PLUNGERS

Terminals move during lamp insertion or removal.



CORD GRIP

Spring or solid plungers. Has effective cord grip. One type lamplocking, key operated.

CORD GRIP 'DREADNOUGHT'

Heavyweight, with porcelain interior, solid plungers, non-rotating cap, and effective cord grip.

THREADED

Spring or solid plungers. Choice of six threads:—
⅜", ½", ⅝" brass,
⅛", ¼", ⅜" conduit.

T.R.S. GLAND

Spring or solid plungers. With screwed bush and grommet, to grip 14/.0076 round twin T.R.S.

BATTEN

Spring plungers. Easily wired body removes from base rear. 2" fixing centres. Available with "loop-in" third terminal.

SIGN

Spring or solid plungers. With shade carrier ring. Without cap. For clamping through a metal or other plate.

"Ashley" Home Office pattern shield

ANGLED BATTEN

Angled 45°. Spring plungers. Easily wired body removes from base rear. 2" fixing centres. Available with "loop-in" third terminal.

FESTOON STRIPLIGHT

Spring plungers. Black. Clamps on and connects to flat twin T.R.S. Weatherproofing sleeve and grommet available.

LIGHT UP WITH

Ashley Regd. GUARANTEED ELECTRICAL ACCESSORIES Regd.

ASHLEY ACCESSORIES LTD
ULVERSTON, LANCASHIRE
Phone: Ulverston 3333 Grams: Ashley, Ulverston
MEMBER OF THE "ASHLEY" GROUP

B

Travel

and the BALANCE OF POWER

IN THE BUSY INDUSTRIAL NORTH, trains running from Manchester to Sheffield will soon be electric. In the Southern Region, plans are well advanced for the electrification of 200 more route-miles, covering extensions from Gillingham and Sevenoaks to Ramsgate, Folkestone and Hastings. And in the Eastern Region, the Liverpool Street–Shenfield system is to be extended to Chelmsford and Southend. More plans will follow.

There are good reasons for using electricity on the railways. Electric trains are clean, powerful, fast—and they use the nation's coal resources more efficiently. Greater use of electricity for transport is good news for all consumers of electricity. Why?

It's a matter of balance. As more electricity is used in more ways, the different loads—occurring, in the main, at different times of the day—keep the generating plant more fully employed. And continuous full output from the power stations helps to reduce the cost of electricity.

SIX YEARS' PROGRESS

BRITISH ELECTRICITY

40 NEW POWER STATIONS

50% MORE POWER

A NEW-PRINCIPLE A-C AUTOMATIC VOLTAGE STABILISER

We have now had released to us by a Government Department the design of our "A.C. Mains Regulator, Automatic, Step, Mark II", and are therefore manufacturing this unit for general sale. It ideally fills the need for a cheap, small and light Stabiliser. Although it measures only 8½in. x 4½in. x 5in., weighs as little as 11 lbs., and costs only £24 net, it has a performance fully equal to any similarly rated Automatic Stabiliser of the resonated, saturated core type, without any of the disadvantages.

ASR-1150 has a pure output waveform, is unaffected by changes in mains frequency, and works equally well from no-load to full load, which is 1150 VA. It has a stabilised output at 230V unless otherwise ordered.

Many other Automatic Voltage Stabilisers are now manufactured by us, and all are available for immediate delivery. In some cases the constancy of output is as high as 0.15%. Models are available from 200 VA to 30 kVA, single phase. 3-Phase Stabilisers are also available. Prices are *extremely* competitive.

We can supply from stock all types of American tubes, condensers, valves, potentiometers, etc.

★ *MEMO: If you are interested in infinitely-variable Transformers, do not forget the almost indispensable "VARIAC" (Reg'd. Trademark). Models are available from 170VA to 2½kVA. Our Catalogue V-549 (3rd Edition) tells the whole story, and will gladly be mailed free and post free, on request.*

The *NEW "ASR-1150"* costs only *£24* net

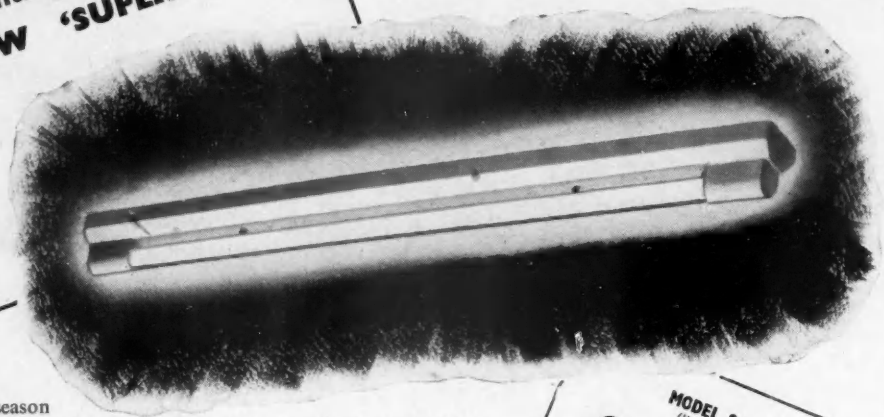
Complete information is obtainable from:

CLAUDE LYONS LTD., *STABILISER DIVISION,*
QUEEN'S HOUSE, 180-182 TOTTENHAM COURT ROAD, LONDON, W.1
(Telephone MUSeum 3025-6 Ext. 13)
NEW SOUTHERN FACTORY, 4-10 WARE ROAD, HODDESDON, HERTS.
(A.10 MAIN LONDON/CAMBRIDGE ROAD, AT JUNCTION OF A.602)

fluorescent MORLITE lighting

The MORLITE 4-STAR Fluorescent Lighting Fittings with the NEW 'SUPER-HARD' Enamel Finish

This new finish will not flake, crack, chip or discolour.



Once more the lighting season is upon us and once again Morlite 4-Star Fluorescent Fittings will take the lead in quality, price and efficiency. Please 'phone or write for free fully illustrated catalogue.

★ **POSITIVE STARTING** (Quick Start or Switch Start)
★ **NOISELESS IN USE** (No Noise Level)
★ **QUICK DELIVERY** . . . and of course, our
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MODEL S.B.5. (Illustrated)
£2. 19. 6 NETT
Complete with all Control gear (less tube)

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Polyvinyl Chloride
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NEW
TAPE
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SELF-ADHESIVE TAPES

High resistance to oils, acids, moisture and corrosion. Provides a perfect insulating seal, even under extreme temperatures. Great dielectric strength (10,000 volts). Smooth plastic surface. High Elasticity. Ultra Endurance.
For all electrical insulating, sealing, binding, wrapping, identification, etc. Available in 7 colours, in widths of ⅜ in. upwards. Heddo Tape is a product of the Heddon-Smith Group.

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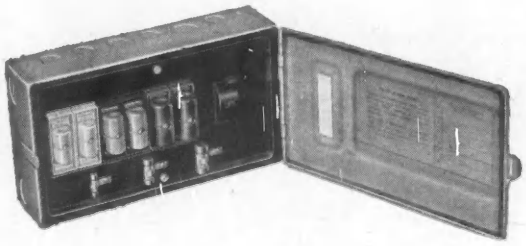
BID

new low-cost rewirable

BICC SWITCH AND FUSE CHAMBER

SPECIALLY DESIGNED FOR SMALL DWELLINGS

If you are engaged on domestic wiring contracts you will find the new BICC Switch and Fuse Chamber exactly the equipment you've been needing—and at the right price too. It is a combined unit, free of all non-essential "extras", yet it meets all the demands of the small modern house with complete safety. Full information is contained in BICC Publication No. 342, which also describes the alternative unit with cartridge-type fuses (below). Your copy is available on request.



THIS NEW UNIT OFFERS:

- Six fuse-ways, which can be arranged in any combination of 5, 15 and 30 amps.
- Popular rewirable fuses, involving minimum replacement costs to consumer. Rating 250 AC1 in accordance with B.S.88.
- Easy wiring in any installation through knockouts in sides, ends and back. Suitable for conduit or non-metal-sheathed cables.
- Handsome cream enamelled case of rust-proofed heavy-gauge steel.
- Double-pole 60-amp. micro-gap switch, adequate for all domestic installations. Full compliance with B.S.1454 as to shielding, provision for earthing and bonding, etc.

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Make More of COPPER

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FIRST ASK THE C.D.A.

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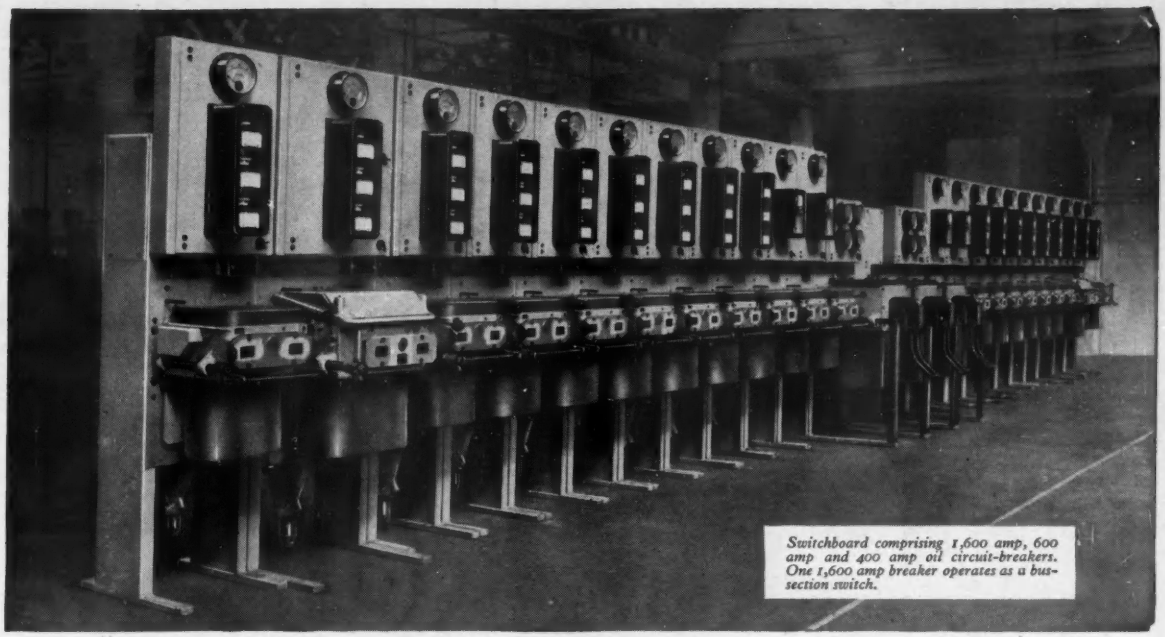
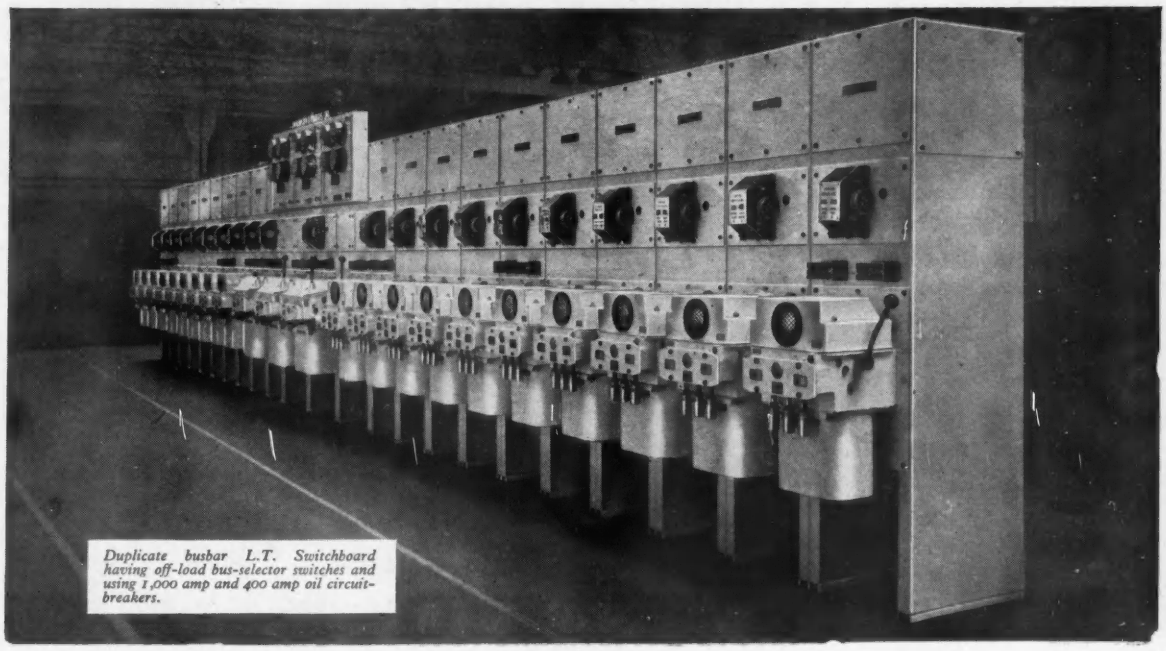


Switchboard comprising 1,600 amp, 600 amp and 400 amp oil circuit-breakers. One 1,600 amp breaker operates as a bus-section switch.

J. & P. LOW VOLTAGE SWITCHGEAR

These two switchboards supplied to the Iraq Petroleum Company are typical of J. & P. low voltage oil-break switchgear. Designed and A.S.T.A. certified for ratings up to 2,000 amp, 30 MVA, this gear can be supplied with horizontal isolation if required. Power closing mechanisms are available for the higher current ratings and rupturing capacities.

JOHNSON & PHILLIPS LTD., CHARLTON, LONDON, S.E.7



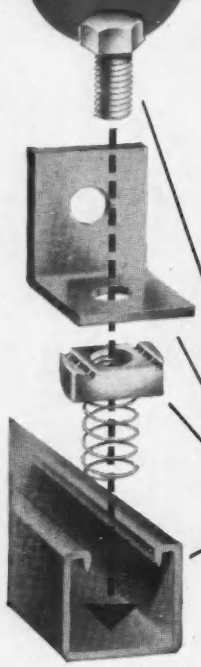
Duplicate busbar L.T. Switchboard having off-load bus-selector switches and using 1,000 amp and 400 amp oil circuit-breakers.

This is UNISTRUT

THE QUICKER EASIER WAY TO FRAME, HANG & SUPPORT ALL ELECTRICAL, PLUMBING, HEATING AND VENTILATING EQUIPMENT

COMPLETELY ADJUSTABLE. NO DRILLING. NO WELDING. NO DETAIL DRAWINGS REQUIRED. "UNISTRUT" SAVES TIME, LABOUR AND MONEY

THE BASIC COMPONENTS



THE BASIC COMPONENTS

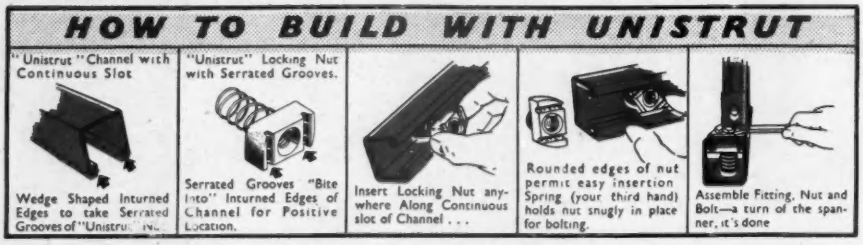
Unistrut Bolt
½" and ¼" sizes.

Unistrut Framing Fittings.

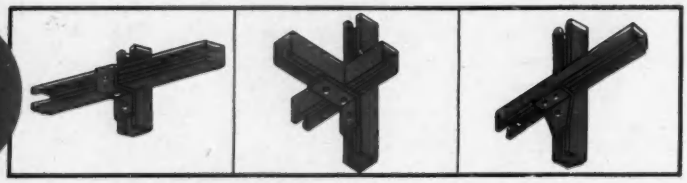
Unistrut Locking Nut.

Unistrut Channel 12 gauge 10'-0" and 20'-0" standard lengths.
Standard finish - Bonderized and stove enamelled olive green. Also available galvanized or plain, oil protected.

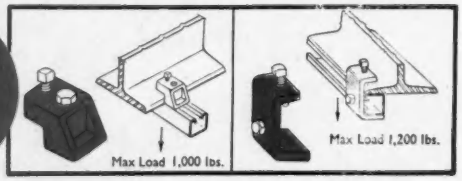
HOW TO BUILD WITH UNISTRUT


"Unistrut" Channel with Continuous Slot
Wedge Shaped Inturned Edges to take Serrated Grooves of "Unistrut" Nut.
"Unistrut" Locking Nut with Serrated Grooves.
Serrated Grooves "Bite Into" Inturned Edges of Channel for Positive Location.
Insert Locking Nut anywhere Along Continuous slot of Channel . . .
Rounded edges of nut permit easy insertion Spring (your third hand) holds nut snugly in place for bolting.
Assemble Fitting, Nut and Bolt—a turn of the spanner, it's done

FRAMING FITTINGS

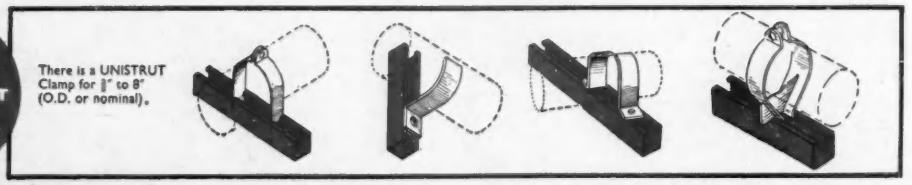


BEAM CLAMPS

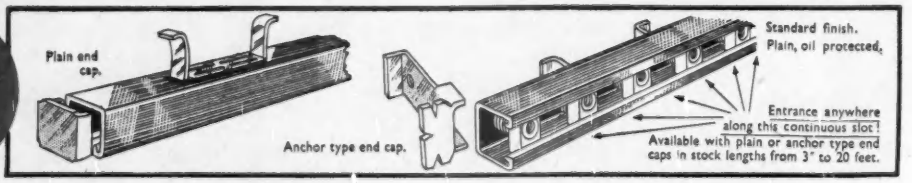


ROLLER PIPE SUPPORTS

CABLE PIPE AND CONDUIT CLAMPS



CONCRETE INSERTS


Plain end cap.
Anchor type end cap.
Standard finish. Plain, oil protected.
Entrance anywhere along this continuous slot!
Available with plain or anchor type end caps in stock lengths from 3" to 20 feet.

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UNISTRUT

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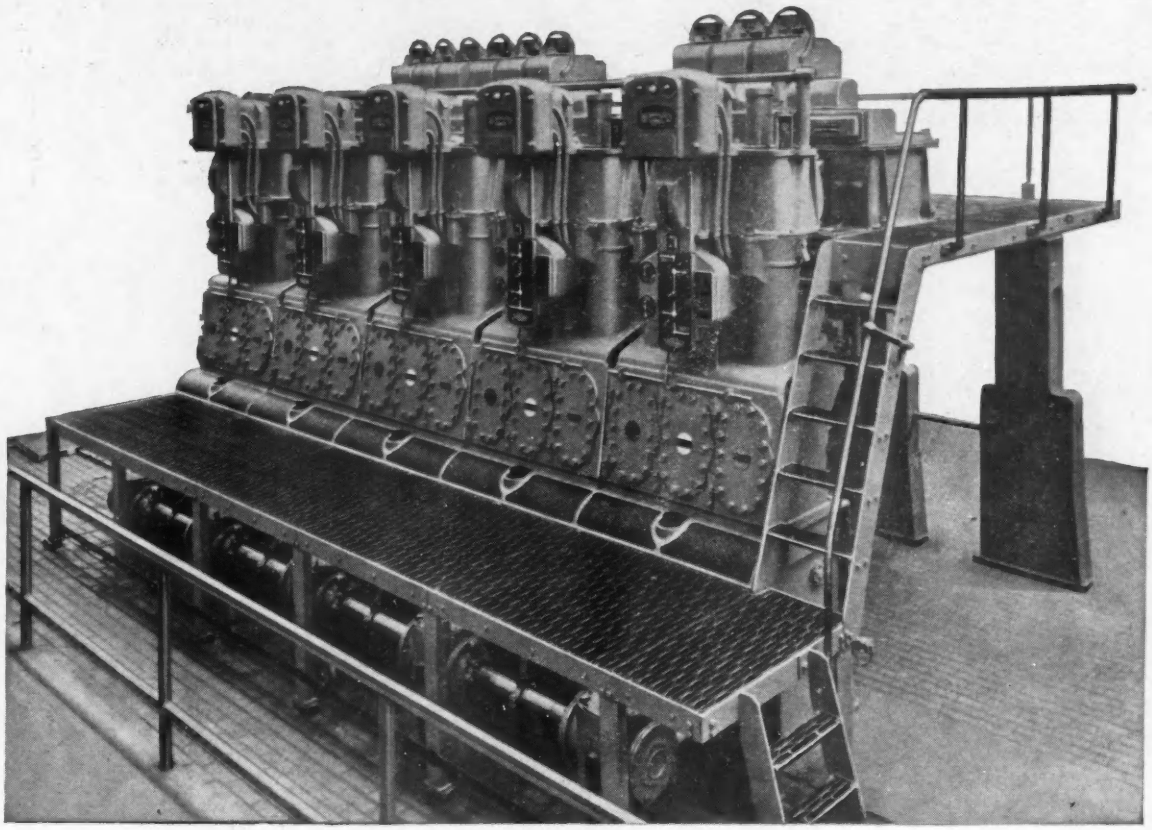
SWITCHGEAR Type SB14



1000 MVA at 33 kV

Current capacity 400, 800 and 1,200 amps.
Fixed breaker gives compact layout and maximum economy in building space.
Phase segregated with complete earthed metal barriers between phases.
No insulation exposed to air. Condenser bushing busbars.

WINGS DAY
SEPT. 18th
Give for those who Gave

METROPOLITAN-VICKERS
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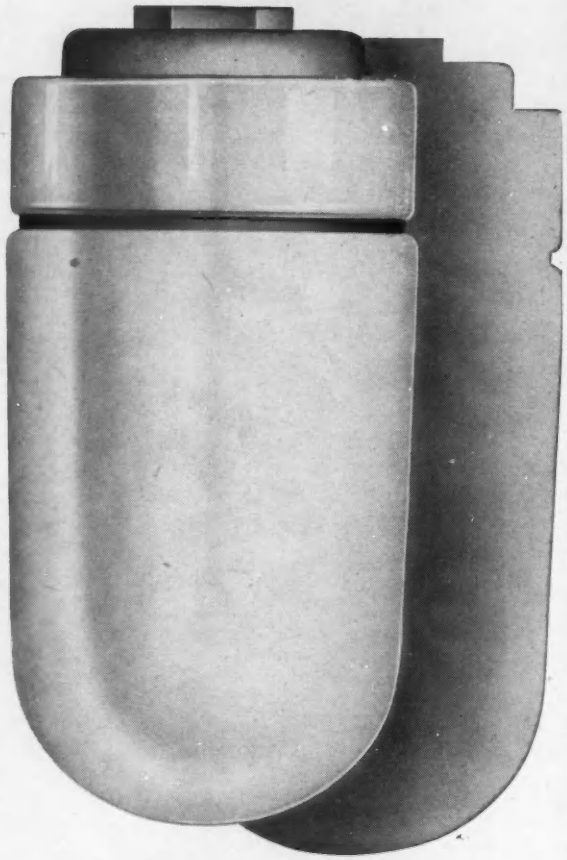
Member of the A.E.I. group of companies

Leading Electrical Progress

How nice it is . . .



. . . that the

R.E.A.L.

NON-CORRODIBLE WATERTIGHT FITTING

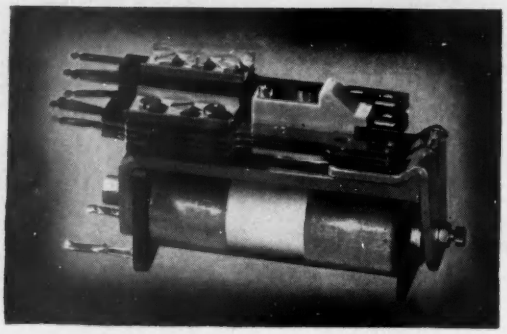
saves time and money in erection and re-lamping . . . and costs nothing whatever for maintenance

Leaflet No. P.9512 gives details of the 60 watt, 100 watt and 200 watt range of Fittings

Patent No. 568702

Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, Birmingham 18

STEVENAGE RELAYS LTD



- Manufacturers of **Type 3,000** relays with contacts and windings to customers requirements.
- Designers of relays to meet special requirements.
- No used or second hand materials employed

For particulars apply:

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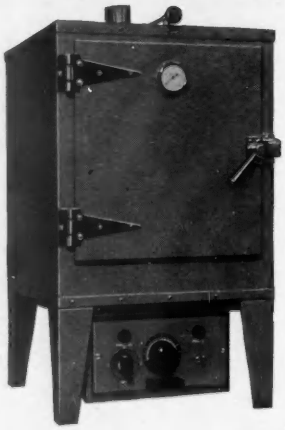
Grosvenor 1716

HEDIN



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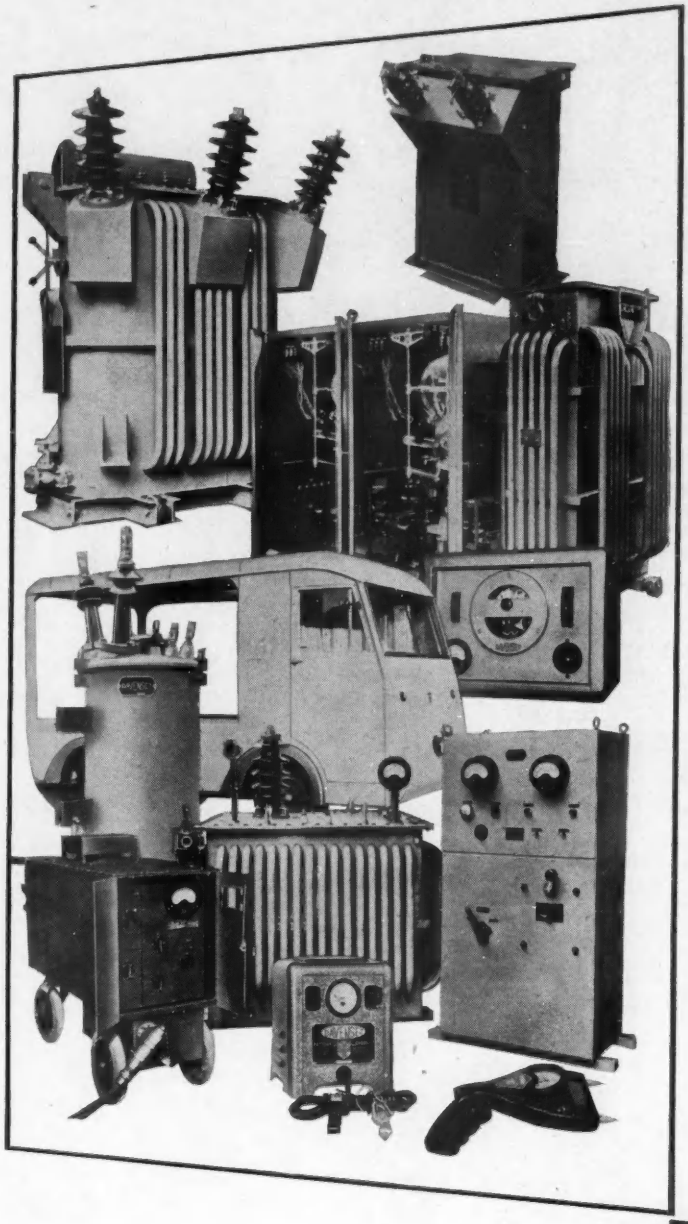

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electric vehicles

DAVENSET—a name on which you can rely; products that will never let you down.

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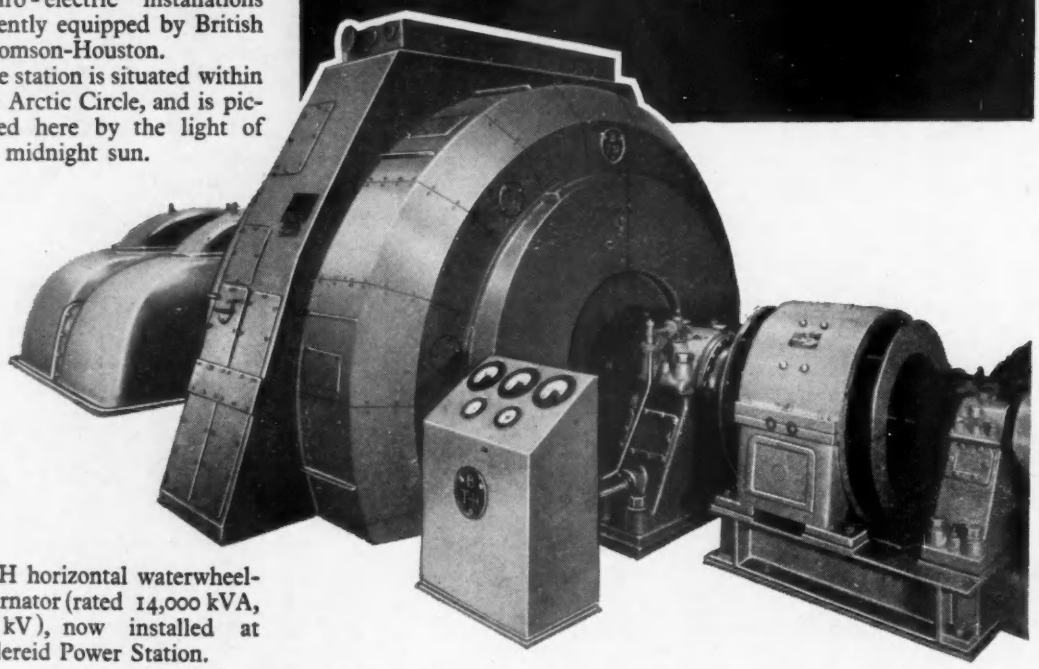
PARTRIDGE WILSON & CO. LTD.

DAVENSET ELECTRICAL WORKS · LEICESTER

B T-H *inside the Arctic Circle*

Hydro-electric Equipment at Oldereid power station, Norway

One of several new Norwegian hydro-electric installations recently equipped by British Thomson-Houston.
The station is situated within the Arctic Circle, and is pictured here by the light of the midnight sun.



BTH horizontal waterwheel-alternator (rated 14,000 kVA, 6.6 kV), now installed at Oldereid Power Station.

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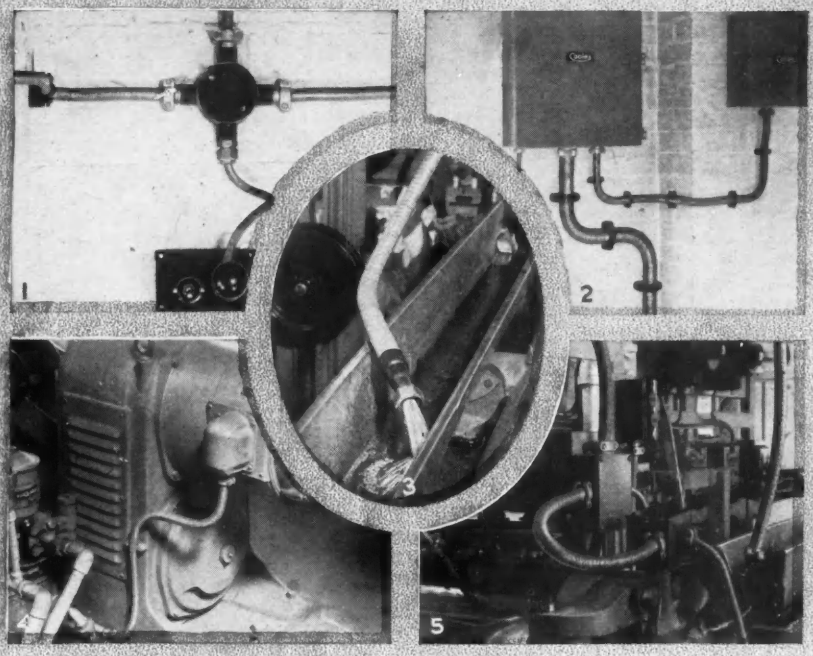

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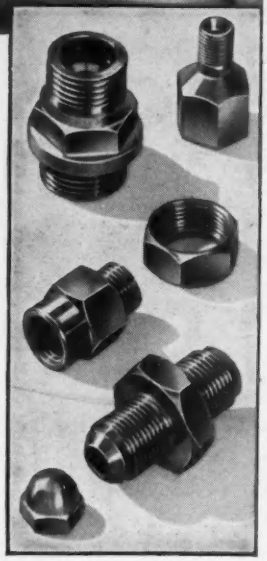

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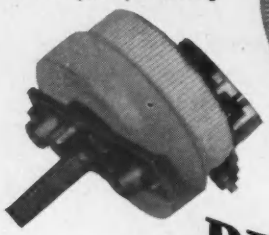

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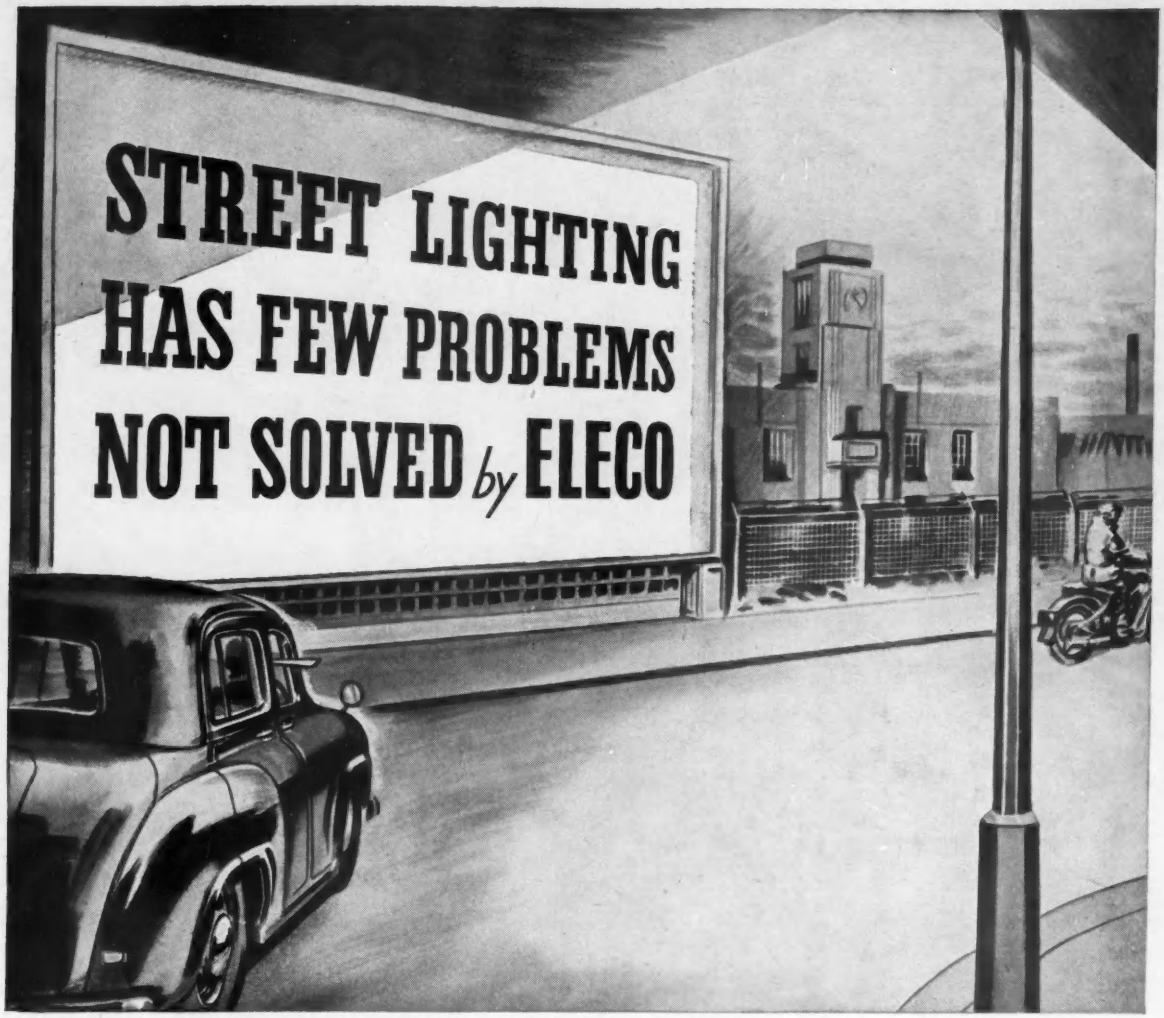

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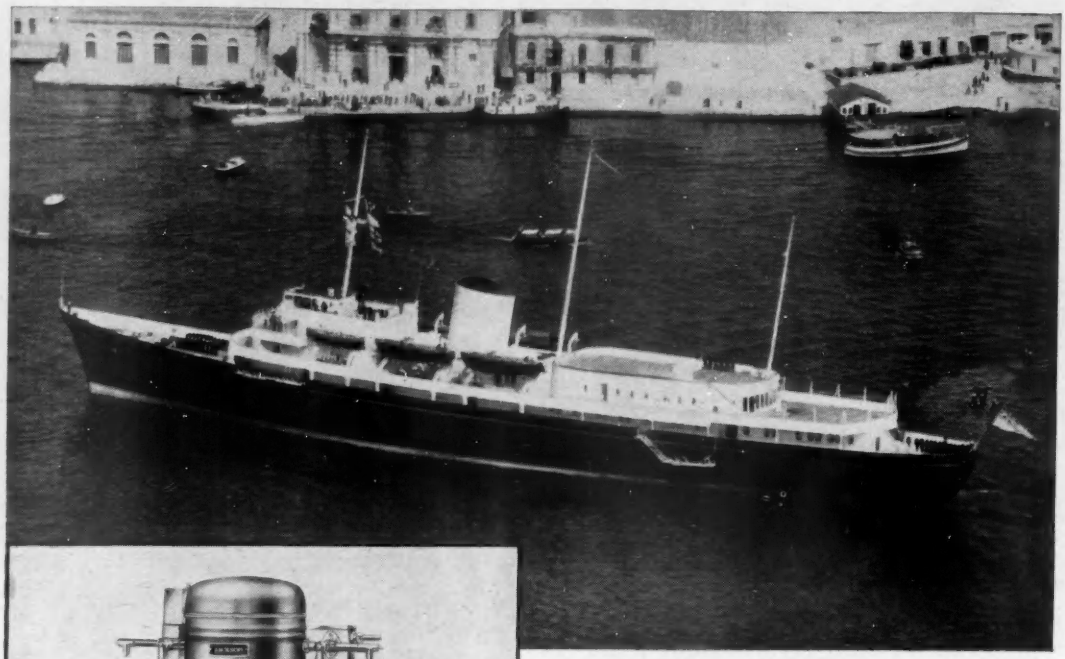

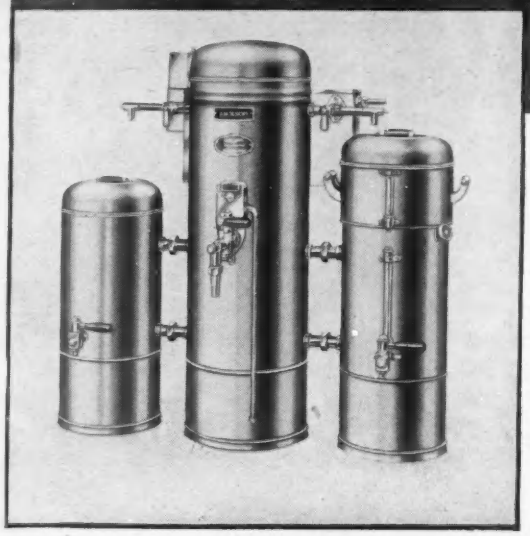

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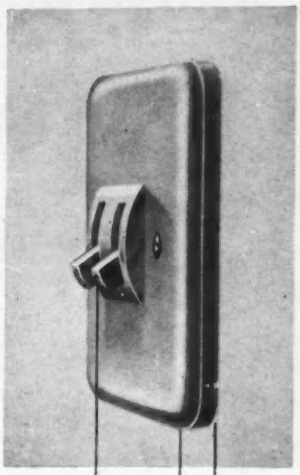

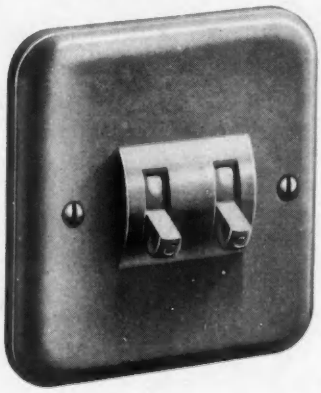

- The switch may be operated in silence.
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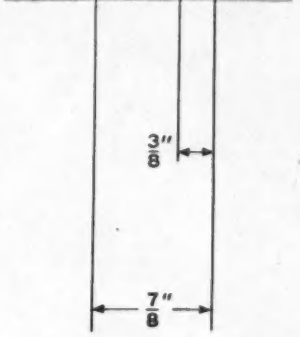
- A competitive switch of robust construction, in every way comparable with the other sturdy "Lincoln" wiring accessories.



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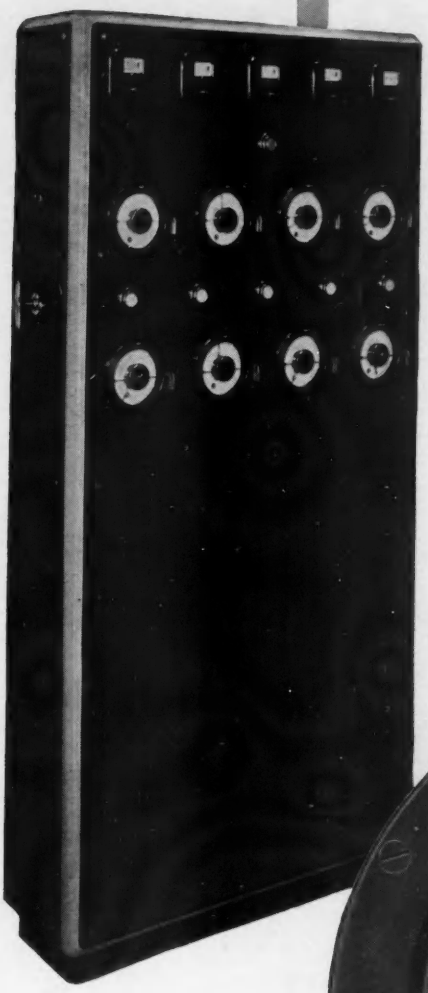

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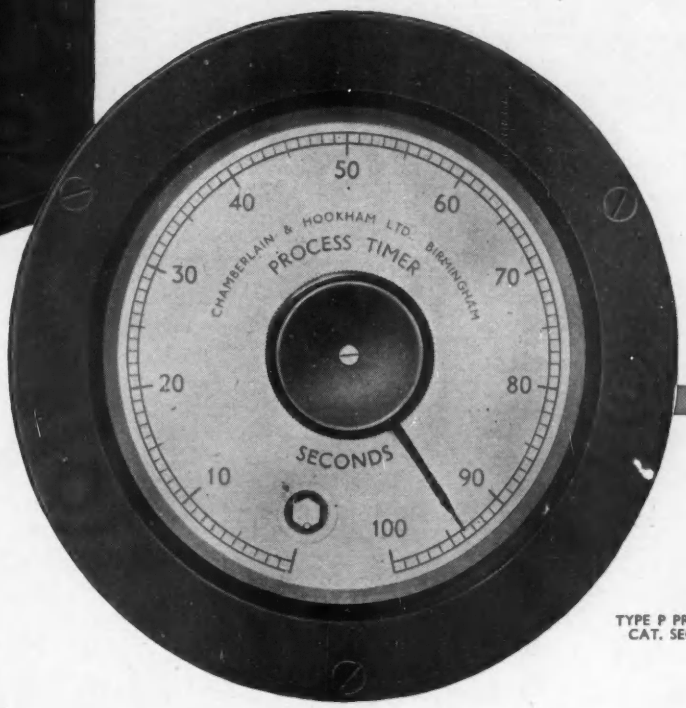

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Central concrete standards in Devonshire Place carry vertical-mounted fluorescent lighting.

At Eastbourne

Photographs by courtesy of South Eastern Electricity Board

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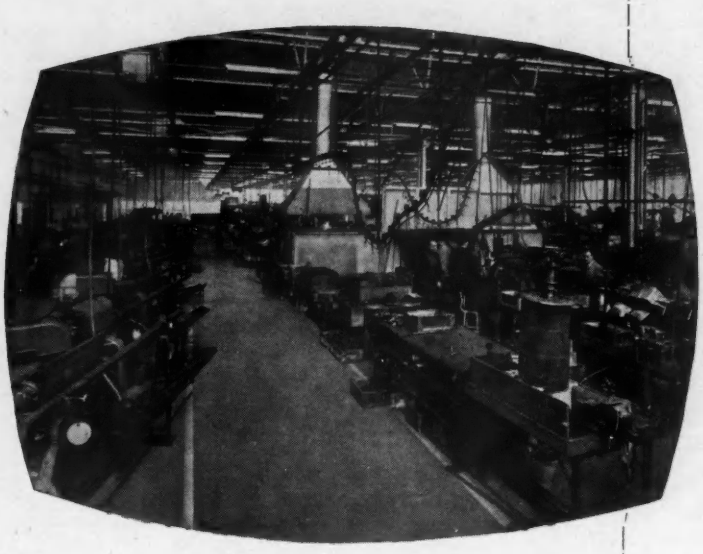

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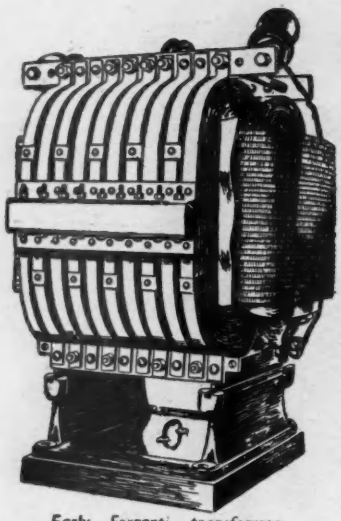

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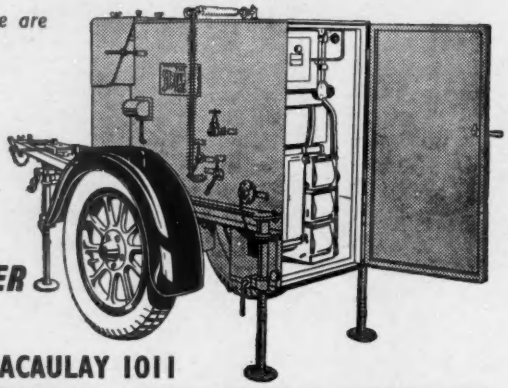

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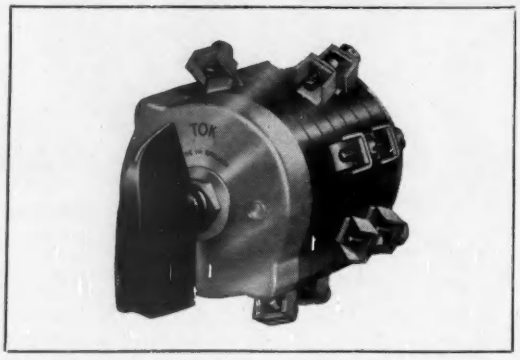

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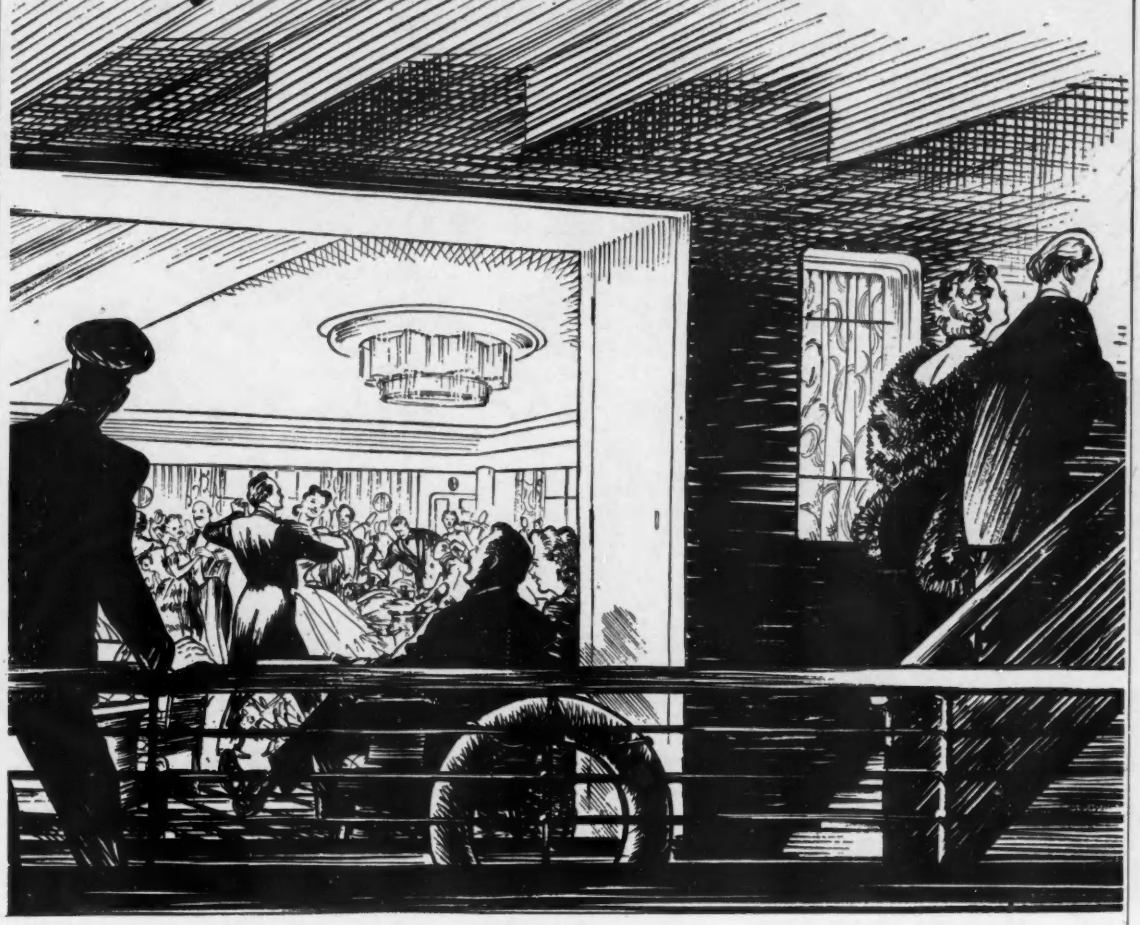

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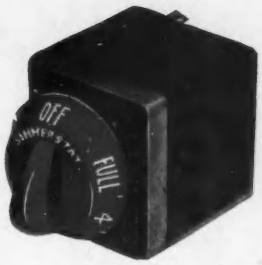

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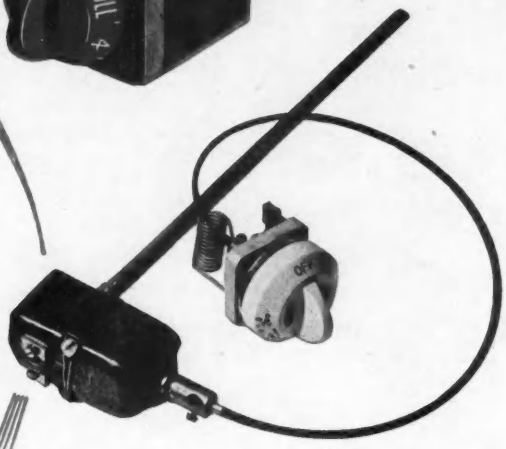

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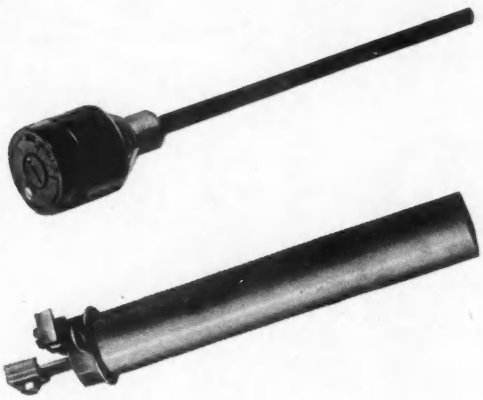

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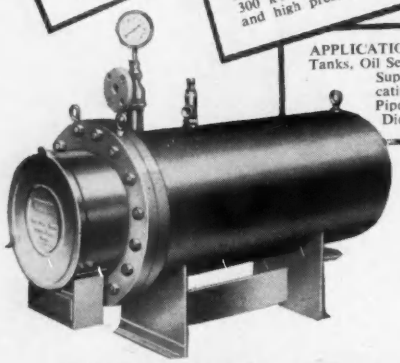

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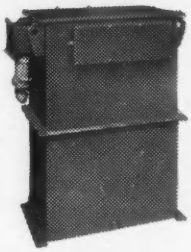

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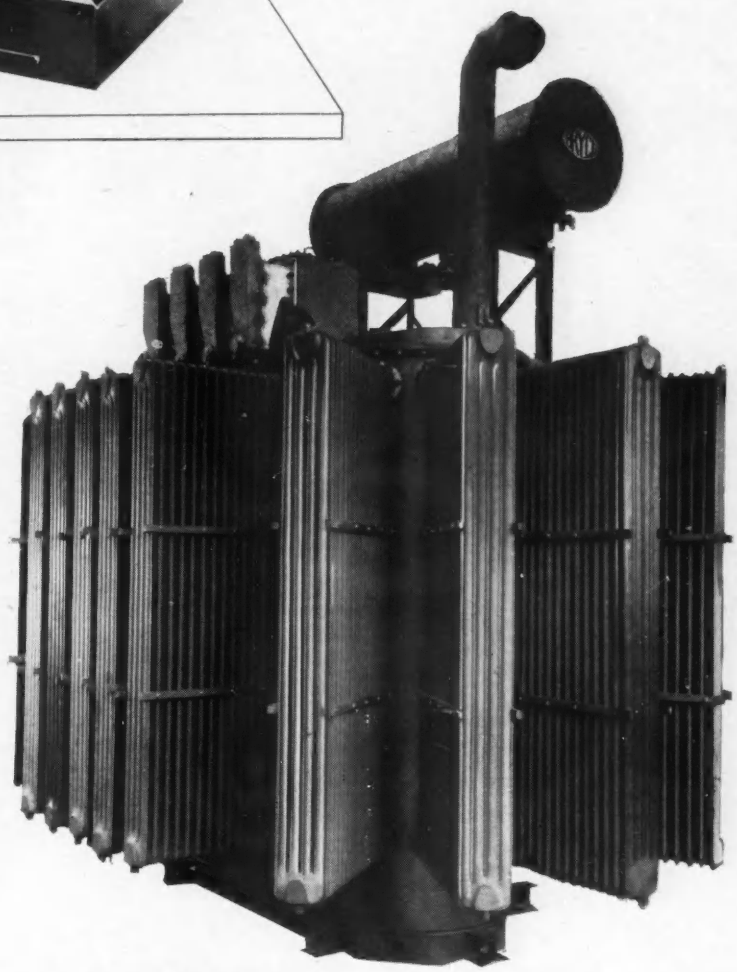

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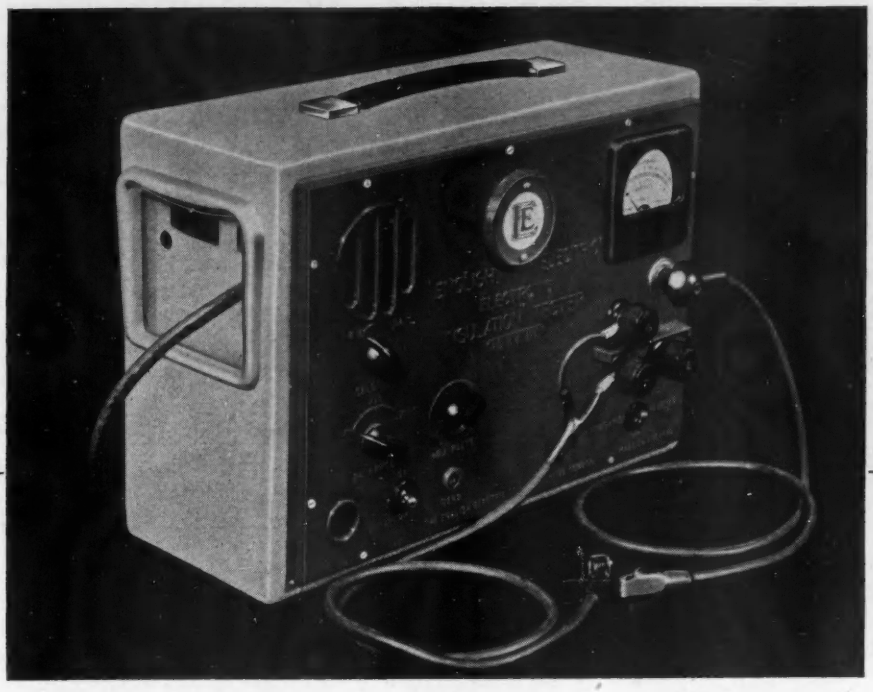

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PRODUCTIVITY AND PUBLIC OPINION

Most reports of teams which have visited the United States under the Anglo-American Council on Productivity programmes have given the general impression that managerial techniques well known in Great Britain are somehow applied more effectively across the Atlantic. Thus it is understandable that the last of the teams to make an American journey should have investigated this matter in particular. Their report contains one outstanding departure from the usual pattern. The team enters the political field with an unambiguous recommendation that "monopolies legislation in Britain should be considerably strengthened and its range extended to ensure competitive conditions." Such has been the impact of the vigorous competition they found in America, that they feel the need for its encouragement in this country by legislative as well as technical means. Their recommendation is not necessarily for an extension of the methods at present used in this country; "increased competition" is an aim more understandable than the nebulous "public interest" which is the concern of the present Monopolies Acts. The aims of the team are, none the less, far reaching: as a first step, compulsory publication of all trade association agreements and trade union rules is suggested. This might indeed show some surprising examples of anti-productivity restrictive practices condoned by both sides of industry, but would such exposure to public opinion indeed produce any intensification of the competitive spirit? Only, it seems, if public opinion were already informed of and enthusiastic for spurring on productivity through competition.

COOKING TO TIME

Some outstanding new feature is an unsurpassable selling aid, and in gas-electric competiton in the domestic cooker field the advent of time-switch cooking provides just such an appeal. The introduction and development of the electric automatic time-switch as an accessory to the electric cooker has some obvious attractions for all housewives, but it matches particularly well the present needs of the many families where both husband and wife are out to work. Meals prepared in the morning, left in the oven, and switched on an hour before home-coming can remove one of the greatest difficulties facing such couples E.D.A. has chosen the current Food Fair in London to launch a strong campaign in support of this development, and this may well achieve a significant success. Many improvements introduced into domestic cooker design in the past by the electricity industry have been

seized on and exploited by its gas competitors, but they will be hard pressed to counter this latest move, which provides yet another example of the versatility of electricity around the house. In pressing this advantage, however, the convenience of those already converted to electric cooking must not be forgotten. Attention should be given to facilitating the fitting of time switches to existing models, for propaganda from the satisfied user should be the strongest weapon in a selling campaign.

SAVING SIDING SPACE

In considering the general problem of extending power stations, it sometimes happens that a comparatively small factor may provide a difficulty of major proportions. Such a case occurred with the power station extensions at Leicester where due to the presence of the river and of built-over ground the existing siding capacity could not be extended to cope with the increased coal requirements. A way out of this difficulty was found by using a system whereby wagons can be moved laterally on electrically operated traversers across parallel tracks, and be transferred from any one track to another. Such a concept is not new in principle and has, in fact, been used for many years in tram depots and in railway works for convenience in handling the vehicles themselves. As is shown in our description on page 361 the saving in space is considerable as compared with the more conventional system of "balloon" sidings, and at the same time less labour is required for handling greater quantities of coal. Such an installation, however, is not cheap in capital cost, and, with the present tendency to site power stations outside urban areas; will in many cases be found unjustified economically. There are, nevertheless, urban sites where extensions are contemplated and here the traverser system may prove a critical factor.

ATOMIC FUEL FUTURE

It is surprising to realise that Sir John Cockroft's address to the British Association is the first presidential address to deal with nuclear physics before any section of that body since 1923: yet this, in very fact, serves to emphasise the advances that have been made in the intervening years. There were no signs in Lord Rutherford's address of that year of the practical applications of the subject which so concern Sir John. At this year's meeting, in addition to reviewing the strange multiplicity of mesons on which interest now centres, he has felt the need also to give a reminder that supplies of nuclear fuels are not unlimited. The premium on their efficient use is far greater than that attaching to similar care with coal and other traditional energy sources. In Sir John's striking phrase "engineers who waste fuel can easily offset the bounty of Nature." Yet at the same time that he delivered this warning Sir John expressed a personal conviction that a still more plentiful source of energy lies ahead. Synthesis of the light elements, at present possible only in the uncontrollable fury of the hydrogen bomb will in the distant future be harnessed to peaceful ends, in his opinion. Admittedly, he spoke in terms of ultimate possibilities, when perhaps centuries of effort has perfected our understanding of the innermost mechanism of the nucleus, and so this development is most unlikely to have any early effect on immediate progress in this field. Yet practical nuclear power stations are decades nearer than seemed possible a few years ago. Who can judge the speed of thermo-nuclear developments, if the harnessing of such great forces be once admitted as possible.

SUPPLY GEOGRAPHY

Faced with a normally unrelated science, the expert in some other branch of studies can usually be counted on to make some interesting and provocative observations. There was no exception at Oxford this week when the Geography section of the British Association heard Mr E. Rawstron's paper on the economic geography of the electricity supply industry in this country. The main topic under discussion was the B.E.A.'s plans to concentrate many new stations on the banks of the River Trent, and in dealing with this, Mr Rawstron contrasts the effective local generation that has been the rule in this country until recently, with the present plans and their associated transmission schemes. As a geographer, he concludes that a reason for the change is to be found in the virtual cessation of improvements in thermal efficiency as a means of major economy in the industry and in the resultant necessity to consider two geographically significant factors, the location of the market and the location of the coalfields, as being now of prime importance in the cost structure of the industry. His argument rests, however, on the improbability of significant improvements in thermal efficiency of generation after 1970. Work now in hand may produce greater effective improvements than he seems to expect. The geographical analysis of the new move is perhaps a trifle over-ingenious, though it is welcome for the new angle it presents on familiar problems.

FUTURE PEAK STATISTICS

The convenient way of dealing with obviously extreme values obtained in experimental work in the laboratory is to ignore them as being unrepresentative. On a full engineering scale this is unfortunately not possible, and much attention has been given by statisticians to evolving methods of handling such "catastrophic" figures as exceptional flood levels. There is a reminder of this work in a recent U.S. National Bureau of Standards publication on some practical applications of the statistical theory that has been evolved. Unlike most statistical work, that dealing with extreme values involves attaching a precise significance to low probabilities: it has a direct practical application, however, in the rational determination of economic safety factors. Perhaps the estimation of the probability of future exceptional flood discharges on a basis of past river-flow statistics is the application most easily appreciated, but there are many others of more direct electrical significance. It does seem, indeed, that the techniques might even prove of use in estimating the likelihood of given levels of national peak demand. Several incidental variables would have to be eliminated but an answer might prove of great value in planning electricity supply systems in the near future.

Meteor

Filling Compounds *for Power Cable Accessories*

THEIR SPECIFICATION, CHARACTERISTICS AND APPLICATIONS—PART 2

By A. KING

COMPOUNDS for power cable accessories have vital roles in cable systems, and in this article an attempt is made to classify such compounds, describe their characteristics and methods of test, and deal briefly with choice of compound and with filling practice. Part 1 dealt with typical tests and gave particular attention to bituminous oil/rosen compounds. The electrical characteristics of the latter type of compound now fall to be discussed.

Electrical characteristics

Dielectric loss angle (tan δ) and permittivity are two characteristics assume increasing importance with increasing cable system voltage (a.c.) above about 11 kV, as their product is proportional to the total power loss which is a measure of energy expended in heat due to the losses produced within a dielectric. The permittivity, otherwise known as specific inductive capacity (s.i.c.) or dielectric constant, of oil/rosin compounds varies little in the effective temperature range, but the D.L.A., or power factor, is very susceptible to temperature change and must not be allowed to approach levels associated with thermal instability.

Fig. 9 shows D.L.A. and permittivity plotted against temperature for a typical high quality oil/rosin compound. The U-shaped D.L.A./temperature curve is characteristic of oil/rosin compounds; the higher value at 10° than at 60° C will be noted.

Capacitors such as are used for cable oils and compounds, generally of concentric cylinder construction, in conjunction with Schering bridge equipment, are suitable also for the present compounds; the Clark Cell [8] is one which has been found to give accurate results during several years of daily service. Extreme precautions in cell cleaning and attention to the condition of test samples must be taken to obtain reliable D.L.A. results.

The a.c. strength of oil/rosin compounds is markedly dependent on temperature and on their freedom from moisture and other foreign matter. These points are illustrated in Fig. 10 which shows the breakdown values at different temperatures between 13 mm diameter spheres with 1, 2 and 4 mm gaps of oil/rosin compound made in a laboratory (*a*) after short storage in a sealed can, and (*b*) after further filtering through sintered glass, followed by extreme dehydration under vacuum; all samples withstood a preliminary proof test of 15 kV for 1 minute and the voltage was then raised at a rate of 1 kV per 5 seconds. The specially treated samples gave much the higher results, although the original compound had been prepared and stored under good conditions, including filtration and dehydration of at least commercial standard. The apparatus and procedure of B.S.148:1951 "Insulating Oil for Transformers and Switchgear" are generally applicable, but the following deviations and points for noting are appropriate to oil/rosin compounds.

Mr King is with British Insulated Callender's Cables. Part 1 of this article appeared in our issue of 2nd September, and all references were listed then.

(1) A gap of 2 mm, instead of 4 mm, is more widely acceptable when breakdown values are required: alternatively, a gap of 1·27 mm (0·05 in.) has the advantage of enabling comparisons with bituminous compounds to B.S.1858.

(2) A test temperature of 60° C has a similar advantage, and approximates closely to the maximum reached in service; test results are more reproducible at 60° than at 20° C.

(3) A proof test of 20 kV r.m.s. for one minute sets an adequately high standard.

(4) As in the case of D.L.A. measurement, scrupulous attention to the cleaning and drying of apparatus is essential.

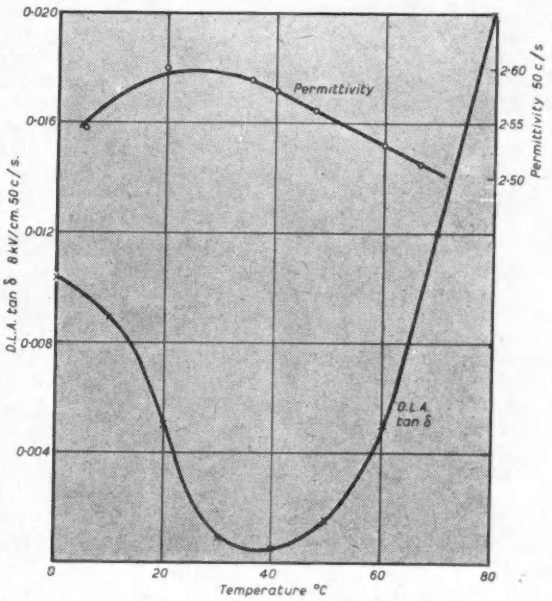


Fig. 9. Oil/Rosin Compound. Dielectric Loss Angle (tan δ) and Permittivity plotted against temperature

When testing deliveries, samples from containers should be given no treatment other than something resembling that to which compound is subjected before pouring into accessories, e.g. heating in an open glass vessel at a temperature of 105 to 110° C for 30 minutes.

Physical Properties and Flash Point

The density of oil/rosin compounds at 20° C is commonly about 0·95 and less than 1·0. They are frequently too viscous for the determination by hydrometer, and when coefficient of expansion is required the determination of density at about 20° C and 100° C is conveniently carried out with a Sprengel-Nicol pyknometer (see also I.P.-59/53, Method G).

Most oil/rosin compounds have coefficients of cubical expansion in the range 0·0006 to 0·0007 per degree Centigrade, and the value is of interest in accessory design. Flash-point (open) is of no greater significance to oil/rosin than to bituminous compounds. From the nature of the rosin and the viscous oils used, it is evident that the value will always exceed about 200° C.

Rosin Recrystallisation

Rosin is liable to separate from oil/rosin compounds, especially under certain conditions, but experience in the choice of materials and of blending conditions reduces the tendency considerably. Solvent-refined rosin and some pale grades of gum rosin are to be avoided, especially in combination with low density, low viscosity paraffinic-type oils; often, but not invariably, the hazard of separation increases with rosin content.

Heating and cooling cycles, for example, in the temperature range 20° to 60° C, assist rosin recrystallisation, which is further aided by the presence of fine, suspended particles of iron rust and the like; tests are based on these factors but time is another, and massive recrystallisation can take months to develop.

In its most extreme form the compound comes to resemble sugary honey, with rosin-poor oil in a matrix of rosinous crystals, but in early stages the solidifying phase sometimes appears flocculent.

Although manufacturers have taken great pains to produce stable compounds, this has been to allay users' fears rather than to avoid serious performance misbehaviour. There is evidence that some degree of separation improves certain electrical properties, and little indication of increased rate of compound migration. In rare cases of separation occurring during storage in despatch containers, an otherwise good quality compound can be homogenised easily and satisfactorily by heat treatment to maker's instructions.

Impurities

The number of possible trace impurities which can affect oil/rosin compounds is legion, and they may emanate from the two materials and during manufacture, and from packages. They present problems for the manufacturer, who, if he is a cablemaker familiar with similar compounds for cable impregnation, will know how to deal with them, rather than for the user who is concerned that his compounds have satisfactory electrical characteristics.

It might be of interest, however, to refer briefly to a few of the impurities in question. Modern refining processes ensure that insulating oils seldom contain significant amounts of deleterious impurities, but very occasionally finished oils contain traces of, for example, sulphonic acids and the like which have been removed incompletely. These, in association with traces of metals, such as iron and copper, can give rise to forms of instability, sometimes of delayed action; very small quantities, as little as parts per million, may be involved and extremely sensitive techniques are required for their detection and determination. The mineral matter in the best insulating oils is seldom sufficient to be measurable by ashing. Gum rosin has higher ash contents, the quantity being very variable, a value of 0·03% by weight being typical. Most of this mineral matter is normally natural to the rosin, and is largely siliceous, but several other combined metals are detectable, and copper and iron, sometimes picked up during the production of the rosin, can be present in troublesome amount and form.

The grades of gum rosin used contain up to about 1% by weight of an oxidation product known as rosin oxide, and a little more is likely to be formed during compounding with oil. In good quality compounds the rosin oxide content is low enough and so dispersed as to be quite unobjectionable, but when it is excessive it can cause a distinctive cloudiness in the compound. When oil/rosin compounds are stored for long periods with access to air, a film caused by rosin oxide may form on the surface; in extreme cases this may develop into a crust some thousandths of an inch in thickness. Films may be ignored as they mix thoroughly into the compound when it is heated for use, but thicker layers should be scraped off with a hot, clean knife or spatula.

Oil-resisting Compound

This class of compound is more expensive than most bituminous and oil/rosin compounds, as the few suitable basis materials are themselves costly, in particular the gums. Two types manufactured in the United Kingdom have given extensive and satisfactory service, the cheaper depending on selected vegetable pitches, while the second, the more oil-resisting, contains natural gums for which synthetic substitutes have not been found. The gum compounds of reduced cost contain added, finely dispersed mineral matter which is beneficial also to some physical properties.

The characteristics required of, and tests for, oil-resisting compounds are in nearly all respects identical with those of B.S.1858, which, however, covers bituminous compounds only; one test not applicable is that for solubility in CS_2, and, of course, this British Standard does not include oil-resistance.

Tests for oil-resistance vary according to the type of compound: the blackness of the vegetable pitches lends itself to visual assessment of the compound dispersion in pale oil, and the organic acidity of some gums enables a semi-quantitative determination of the solubility in oil of compounds containing them; in connection with this reference to organic acidity, it is explained that the gums in question are not corrosive. Samples of compound for these tests are spread over a large area and submitted to the action of oil at raised temperature for periods of hours or days, according to requirements. The oil is generally one having high solvent power, such as transformer or oil-filled cable oil, these being considerably more active than viscous oil/rosin compounds.

Among the applications for oil-resisting compounds are boxes connected to transformers and switchgear, at the lower end of inclined cable runs, and in the sealing chambers of disconnecting boxes, for voltages up to 33 kV. They should not be expected always to provide complete cures for compound migration and oil leakage; in many cases it is sounder to install non-draining cables on the one hand, and to use oil-resisting compound on the other, for filling the bushings of transformers and switchgear. When the compound is adopted as a palliative it can often be supplemented to advantage with oil-resisting tape.

Miscellaneous Compounds

The various compounds which might be considered to fall into this category are too numerous to be treated in detail in the present context, but the subject merits brief reference, if only to indicate what is available.

In a broad interpretation of the term bituminous filling compound one might include (1) certainly compounds for filling the outer protection boxes of cable accessories, (2) cold-pouring and fire resisting compounds, (3) compounds for polythene-insulated low voltage cable boxes, and (4) sealing compounds which are generally plastic in consistency for cold application, having proofing qualities against moisture, corrosion and oil; resistance to flow at high temperatures is another requirement for some cases.

Protective compounds in the present sense provide reinforcement for the joint proper, and prevent access of mois-

ture and other agents to it. Hence they need to combine adhesiveness, mechanical strength, resistance to water, and chemical stability, with non-flow characteristics. This combination is satisfied readily by compounds based on both petroleum and natural asphaltic bitumens, as proved by good service records. The somewhat cheaper coal tar pitch and gas tar compounds are less reliable if only because of their much greater temperature-susceptibility, i.e., compounds which can be relied on not to flow at maximum temperatures are brittle in the lower part of service temperature ranges, and conversely.

The above applies also to cable troughing compounds for solid laying systems.

Among the several types of cold pouring compounds, each of which has two components for mixing to set quickly by chemical reaction, the best known in Great Britain comprises a bituminous oil and creamy hardener of similar fluidity. This British development has been used on a large scale for about 20 years in coal mines in situations which preclude the heating necessary for hot pouring compounds. Cold-pouring compounds are necessarily higher in cost than the more simple bituminous compounds, and so they are used on a limited scale only for other purposes.

Hot-pouring fire-resisting compounds of bitumen base have been developed also, but find little demand. Ordinary bituminous compounds are not suitable for use with polythene insulated cables, but there is available a compound which can be poured at such a temperature as not to harm the polythene and yet adheres well to it and to metals, and which bears resemblance to bitumen in certain respects. It does not comply with B.S.1858; its electric strength is comparatively low but entirely adequate for use with low voltage polythene cable accessories.

Plastic sealing compounds vary considerably in composition and nature, typical examples consisting essentially of rubber compounds or of reinforced vegetable oils. Their applications are legion, including the filling of wiring fittings, and the sealing of grooved joints and exposed connections. The combination of various possible characteristics such as suitability for both high and low temperatures, and resistance to acids, alkalis and oil, are seldom found in one compound.

Choice of Compounds

In view of the similarities in design and service conditions of the higher voltage cables and the associated accessories in which oil-rosin compounds are used, there is seldom technical reason for having more than two compounds for systems in Great Britain. If of good quality these need differ only in viscosity and consequently the previous discussion of the subject needs little supplementation. One point worth making, however, is that old-fashioned fears of mysterious ill effects of mixing two oil/rosin compounds are not often well founded: it just remains a wise precaution to consult suppliers.

Rather more can be said about choice of bituminous compounds, and the subject is introduced conveniently by a few words about B.S.1858. This distinguishes between six classes of compound, five of which are of asphaltic (petroleum) bitumen base, and the sixth of natural asphalt and/or asphaltic bitumen base, containing mineral matter; it does not, and could hardly, attempt to specify in detail compounds for particular accessories, and, in fact, it does not differentiate specifically between compounds for cable accessories and those for other electrical apparatus, which, incidentally, is a widely embracing term. The five asphaltic bitumen compounds are simply classified according to softening point, and minimum penetrations are specified for Classes II to VI inclusive, the values having been selected as reasonably attainable by known materials; no

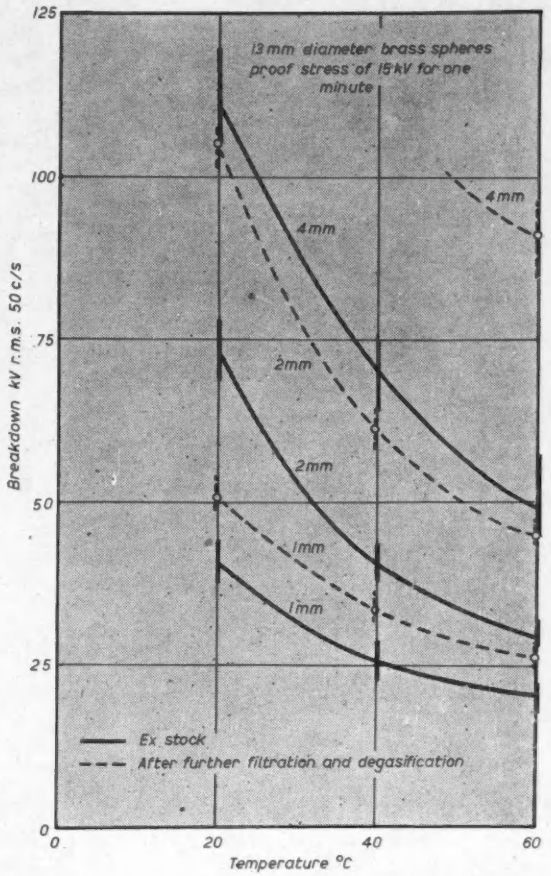


Fig. 10. Electric strength (ac) / temperature characteristic for oil/rosin compound with different test gaps

limits are set for the softening point of Class VI compounds. Similarly, the electric strength, solubility, and mineral matter (ash), contraction, and segregation requirements have been adapted appropriately to compound classes.

The B.S.1858 system of classification is, therefore, of greater significance as regards compounds for electrical apparatus other than cable accessories, for which the need is less, as recognised by the superseded B.S.803 which distinguished merely between natural and asphaltic (petroleum) bitumen compounds.

The first consideration in selecting a bituminous compound is to obtain the highest penetration and lowest softening point consistent with the compound continuing to fill adequately the accessory: the softer the compound the better the chance of good adhesiveness, freedom from brittleness, and low pouring temperature, contraction and depth of pipe, while the probability of comparatively low electric strength is unlikely to be of practical importance.

Softening points of less than about 50° C are not usually associated with sufficient resistance to flow and to solution in cable-impregnating compound; softening points exceeding substantially 90 to 100° C have infrequent justification.

When comparing compound data, little significance should be attached normally to differences of 2 or 3° C in softening point, unless the compound with the high value has also a higher penetration. As an example, a compound of 63° C softening point and 35 penetration is preferable to one having values of 60° C and 30. But, for normal service temperatures, a compound of 60° C softening point and 35 penetration has much better properties associated with its

softer consistency than another giving 70° C and 20 respectively.

Wide ranges of service temperature are the most difficult to provide for; although high softening point is virtually essential, the penetration should also be high, this being less necessary with a good Trinidad bitumen compound which can combine high softening point with rather low penetration, and yet give good adhesion and mechanical strength, and low contraction. Compounds containing a high proportion of blown bitumen can be made to combine high softening point with good low temperature characteristics, but inexperienced users would be well advised to consult suppliers before adopting them: they are liable to be non-flowing to such an extent as to develop cavities during cooling in filling or in service.

Brittle compounds should be avoided, especially when they are likely to be subjected to vibration, such as occurs on bridges, under roads carrying heavy traffic, and in pole boxes. The recent tendency to increase cable temperatures and hence the risk of loss of compound from accessories, gives added emphasis to these considerations.

Users naturally wish to restrict their number of compounds to a minimum and manufacturers have the same object in the interests of production simplification and economics. Nevertheless, it will be clear that a range of several bituminous compounds can be justified for systems covering voltages up to 11 kV; most manufacturers have to review periodically their compound lists, in order to avoid the disadvantages of too many "specialities" introduced to satisfy requirements which are technically ill-founded, and yet retain a wide enough range for service conditions.

Handling of Compound

Good compounds merit good handling to ensure system reliability, and fortunately there has been much improvement in field practice in recent years. At one time customers' complaints about compounds could be traced all too frequently and positively to gross overheating, in particular of bituminous compounds: in one outstanding instance about 20 years ago a batch of compound was so maltreated as to raise the softening point of some tins by 10 to 20° C, with disastrous embrittlement and semi-carbonisation. Detailed advice on the heating and pouring of compounds is generally available from manufacturers, especially when they are also cablemakers who prepare instructions for their own installation departments, consequently salient features only are dealt with below. The practice with oil/rosin compounds differs somewhat from that for bituminous types, and is referred to first.

Oil/rosin compounds are heated in and poured from their despatch containers, either by placing them about 6 inches from a coke fire or by means of a paraffin furnace with two air-spaced baffle plates over the flame. The can caps are first cleaned, removed and placed loosely back to allow for expansion and to prevent entry of foreign matter. Heating should be gentle and the temperature measured periodically with a robust thermometer. If the compound surface remains quiescent, and any other tests show it to be free from moisture, it should be taken only to the recommended pouring temperature, which seldom exceeds 100° C. If moisture is present in small quantity it can be driven off by heating at 100 to 110° C for 1 hour to eliminate the crackling and frothing evidence of its presence. More severe heating to deal with greater amounts of moisture is undesirable, and should be tolerated only under emergency conditions. The accessory is warmed to evaporate surface condensation of moisture and then filled, to detailed instructions, with compound at the correct temperature. When the compound has cooled to about atmospheric temperature, it is topped up as necessary with compound treated as previously. Small remnants of compound should not be stored for long periods as they will become oxidised by the large volume of air available, even in a re-sealed can.

Bituminous and oil-resisting insulating compounds are commonly supplied in tins containing up to about 30 to 40 lb, which are stripped off and the contents dropped into a cleaned, properly designed compound bucket. Heating is as described for oil/rosin compounds, but stirring with a clean stick or rod is necessary to equalise heating and to ensure the homogeneity of compounds containing loading matter; stirring also assists the disposal of small amounts of moisture, which cause crackling and frothing. When the compound reaches the recommended pouring temperature range the accessory is filled in accordance with manufacturers' instructions; these vary with different types of accessory, but common requirements are pre-warming of the casings and topping up after cooling of the first filling, satisfactory blending with the top of which being achieved in most compounds without difficulty. The use of a thermometer should be regarded as indispensable although it is not intended to give the impression that these compounds need to be treated to laboratory standards, especially for the lowest voltages. Nevertheless, it is clearly wise to exercise reasonable care: generally speaking, solid compounds are more liable to deterioration from 1 hour at 50° C excess temperature than from 5 hours at 10° C above the recommended pouring range.

Compounds for outer protection boxes do not often justify the precautions applicable to insulating compounds; unless there are good reasons to the contrary outer boxes are partly filled first, and while still hot the sleeve is filled, thus assisting penetration of compound in any narrow spaces and adhesion.

Finally, it is worth repeating that users should take full advantage of the technical services available from manufacturers, who naturally wish their compounds to give satisfaction. Certain producers, including cablemakers, prove their compounds in their own laboratories or by field trial, and good service performance can be more convincing than a list of compound characteristics, knowledge of which, though valuable and not to be under-estimated, is more subject to personal interpretation.

(Concluded)

Technical College Research

OVER the past few years, official encouragement has been given to technical colleges to engage in applied research. The London and Home Counties Regional Advisory Council for Higher Technological Education has a committee engaged in consideration of the subject, and in a newly published report (No. 18, price 2s. 6d.) they make recommendations for the extension of such research.

At present about a dozen of the colleges in the region accept research by staff and advanced students as a normal part of the curriculum. It is considered, however, in the words of an F.B.I. recommendation, that "scope for research by teachers should be a *sine qua non* in all major technical colleges." Without this, it is suggested that it will never be possible to attract to these colleges staffs of the calibre required.

An analysis of the research published so far suggests a neglect of the engineering industry, and the Council recommends that more attention should be given to it. They emphasise the need to encourage smaller firms to take advantage of the facilities which can be offered by technical colleges. Local authorities should consider appointing research assistants in engineering departments.

READERS' VIEWS

Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor

Second Hands

IN the 26th August edition of ELECTRICAL TIMES Megohm in his "Notes on Wiring" states that clocks in factories and hospitals are normally of the master clock and slave dial type but this type has certain drawbacks because second hands are not fitted and in some circumstances they are most desirable.

We would like to point out, however, that although slave clocks are generally provided with minute and hour hands only, as are a very considerable number of synchronous clocks, it is possible for a full length sweep second hand to be provided. We have supplied very many installations throughout the world where either all the slave clocks or a percentage of the total are seconds indicators.

As is the case with the more normal slave clocks, the number of seconds-indicating slaves that can be controlled by a master clock is unlimited.

We can quote as examples the B.B.C. to whom we have supplied some 50 installations, all of which incorporate seconds-indicating slaves, the majority employing this type exclusively, and the United Nations Building in New York where there are a considerable number of slaves, all seconds indicators.

E. O. Chapman,
SALES MANAGER, CLOCK DIVISION,
GENT AND CO., LTD., LEICESTER.

Dabbling

I WAS very interested in reading Mr Gazard's letter in your issue of 19th August, but I cannot agree with him when he says he can regard dabbling as an innocent pastime.

Does Mr Gazard hear or read of the terrible domestic tragedies caused by dabblers? Let me remind him of just a few that come to my mind as I write. Less than a month ago a 2-year old boy was electrocuted through his father dabbling with a mains wireless set and making the aerial alive at 230 V. Then there was the case of the masseur who was killed with his own apparatus after repairing it himself or, in other words, dabbled with it and thought he had "repaired" it. A fourteen-year old girl was electrocuted at Woking through touching an electric towelrail installed by a member of the family—another dabbler. A woman, in the Potteries, was killed when working with her electric washer after her husband had been dabbling with the 3-pin plug and flex and connected it up wrongly. Another man wired a plug in his house during one week-end and found his wife electrocuted when he got home on the Monday. She had connected the vacuum cleaner to the plug. A sad result of another dabbler's job. No, Mr Gazard, I cannot call dabbling an innocent pastime when it leads to such tragic results.

Ever since 1928 I have been writing and lecturing condemning these "dabblers" and when you say you think control will become necessary you are coming to my way of thinking. In a letter to the local Press less than a month ago when writing about one of these tragedies I said "Electricity at the present supply voltage is a lethal agency and must be treated with the utmost respect. Electricity is a good servant but a bad master. It is perfectly safe when installed by competent men and is one of the greatest gifts that discovery and science have placed in our hands."

No one who is not a duly registered or authorised person ought to carry out any work on an electrical installation connected to the public supply mains. We must face the fact that 230 V a.c. is not an agency to be dabbled with or treated as a hobby by the unskilled and incompetent.

Harry Moss, M.I.E.E., F.I.E.S.,
BRADFORD, YORKS.

* * *

SO far as I know, Harry Moss of Bradford and I have never met, yet we are old friends and this is not the first time we have had a remote-controlled tilt at each other in the arena of a correspondence column. For once I agree with him, in fact any sensible electrical man will support his views on Dabbling.

But Harry Moss should remember what happened to King Canute. We cannot halt the tide of handyman activities, so we should try to control it. We should encourage the amateur electrician to do the job properly, and make him confine his experiments to his own household. When, however, he offers his untutored services broadcast, with an eye to the profit motive, the menace cannot be ignored or tolerated.

Compulsory registration of contractors and operatives would help to remove the menace, but alas, that is only a dream and look like remaining so—in England.

W. A. Gazard, A.M.I.E.E.,
STETCHFORD, BIRMINGHAM.

Rail Electrification in Glasgow

IN November 1951, the Inglis Committee issued a report containing an all-embracing scheme for the reorganisation of the Glasgow and Clyde Valley transport system. This contained a proposal for electrification of the suburban railway system at 1,500 V d.c. using overhead distribution, the scheme to take place in three parts. At that time it was estimated that the first two stages would cost £14m, and interest charges would amount to £410,000 per annum. An estimate of increased revenue of £958,000 was also given.

Despite these figures, it has been argued in the interim period that the costs would be prohibitive, but a step forward was taken on Monday, 6th September, when a meeting was held between the Glasgow Passenger Transport Commission, the British Transport Commission, British Railways, the Scottish Omnibus Group, and Glasgow T.C.

In the view of the Transport Commission, as expressed by Sir Ian Bolton, the electrification of the suburban lines would result in a substantial loss, but it was realised by the Commission that such a development was an essential part of any solution of Glasgow's transport problems.

At an informal discussion it was suggested that the first lines to be dealt with might be those running between Airdrie and Balloch and the Cathcart Circle, as these ran through the congested areas east and west of Glasgow and would tap the new housing estate at Drumchapel where 8,000 houses are being built.

Power for Science

British Association range from nuclear power to semi-conductor for electrical subjects

At its opening on Wednesday of last week, the 116th meeting of the British Association, at Oxford, rapidly attained the high standard to be expected with so eminent a person as Dr E. D. Adrian, O.M., P.R.S., as its President. His address, concerned with humanistic rather than purely technological aspects of nuclear fission, as represented in the atomic bomb, ranged over the likely results of wholesale atomic warfare and human behaviour when faced with either surrendering some of its beliefs or a war which might end the human race, with the conclusion that a scientific investigation of mankind might provide the means whereby man could solve this dilemma.

Unlike last year's meeting, in which it was unusually prominent, electrical engineering was represented directly by only some half-dozen papers, ranging in content from submarine power cables to transistor developments. Foremost in the electrical delegation was the address by Dr Willis Jackson, F.R.S., the President of the Engineering Section, who reviewed developments in three branches of electrical engineering during the last five or six decades, to illustrate his theme of progress occurring by the steady improvement, within a well-established technique of materials employed in it. One particularly appropriate technique was that of transmitting electrical power from one point to another by means of cables, in which by improving the cable material it was possible to increase the upper limit of transmitting pressure from 100 V d.c. in the 1880's to the present day 275,000 V. Highlights during this development were, of course, Ferranti's 10 kV a.c. cable comprising two concentric copper tubes separated by lapped paper impregnated with ozokerite wax and the use of oil as the impregnant, applied at pressures of up to 200 lbs/sq. in. Telegraph and h.t. cables, similarly, have enjoyed comparable improvement resulting from the development of materials such as polyethylene. Another notable development in the field of transmission is that of transformers which can now be made to handle either powers of the order of 200 MVA at several hundred thousand volts or frequencies up to several megacycles/second, due to systematic improvements in transformer steel and core materials.

Another form of progress is the discovery and exploitation of some special property of a material leading to the evolution of a new engineering technique. A notable example is the discovery and development of the germanium crystal triode—a far cry from the natural silicon crystal detector and cats whisker used in the early days of radio telephony but which was the predecessor of the transistor now replacing the thermionic valve almost universally. To conclude, he chose as his second example of this form of progress the emergence of the engineering technique of converting the nuclear energy of uranium into electrical energy, reviewing the development of slow nuclear reactors suitable for power station use.

Nuclear Energy

On this subject, the use of nuclear reaction for power generation, Sir John Cockcroft, K.C.B., C.B.E., F.R.S., also had something to say in his Presidential Address to the Mathematics and Physics Section. Although much of his address was concerned with developments in nuclear physics of little direct interest to the power engineer, his concluding review of nuclear power advances held the belief that nuclear power stations of the type being built in Cumberland are likely to make an effective contribution in filling any gap which may arise in the next twenty years between our energy needs and our supplies. Moreover, they should be able to produce power at little above conventional costs. The application of nuclear fission wisely guided, he concluded, can ensure that for a millenium ahead mankind has all the energy needed to supply its ever growing needs. Before we came to the end of our uranium fuel reserves, moreover, he felt that the energy derived from the fusion of light elements would also be turned to peaceful uses to provide a source of power without limit.

Cross Channel Cable

It has long been recognised that interconnection, with its resultant load and plant pooling enabling savings in plant capacity, reduction of spare plant and the most efficient off-peak production to be obtained, is an essential part of modern power systems. On these grounds not only is the 275 kV super grid economically justified but interconnection with French supply system would also benefit both countries financially and problems associated with this scheme were discussed by F. J. Lane, O.B.E., (B.E.A.). A cross-channel connection, capable of transmitting 100 MW and costing some £4,300,000 would, it is estimated, make possible both a reduction of generating plant capacity amounting to £10 millions and energy exchanges capable of effecting annual savings of £600,000.

When undertaking such a scheme, however, engineering difficulties of some magnitude present themselves as the Channel is no easy boundary to cross. Moreover, although extensive experience has been accumulated in laying and operating submarine communication cables, the knowledge of the behaviour of power cables under water is limited to short lengths and waters quieter than the English Channel. As a result, a joint committee of the B.E.A. and Electricité de France set up in 1950, recommended that initially an experimental programme be undertaken with two selected types of 132 kV cable. Special joints—flexible for factory repairs and rigid for repairs in service—were developed. Results of extensive testing by both Authorities, both on shore and under water, not only showed that no major difficulty should lie in the way of satisfactory operation and installation, but drew attention to a number of ways in which the construction of a cable could be better adapted to the severe conditions obtaining.

A possible installation might include four single core cables laid at 1,000 yard intervals, one of which, being spare, would be available for experimental d.c. transmission. Results of a recent Swedish installation of high voltage direct current transmission, which indicate that, for larger powers, the cost/kW may be closely comparable with that of a.c. transmission, seem to justify consideration of this possibility. At some future date, therefore, when experience has been obtained, the initial 100 MW, 132 kV, a.c. cross-channel connections could be increased to 400 MW by operating each cable at 200 kV d.c. to ground.

Geography of Electrical Supply

For the only other paper concerned directly with power supply and engineering, it was necessary to turn to the Geographical Section, where E. M. Rawstron (Nottingham University) discussed the economic geography of electricity production. In the early years of the supply industry, both production and consumption were restricted to densely populated areas, it being technically impossible to transmit power more than short distances, whilst rural areas and small towns provided markets insufficient to support the high capital charges of both small scale generating equipment and disproportionately long distribution lines. By the end of the first World War, however, these obstacles had been largely removed and the way was then open for less densely peopled areas to be incorporated in the supply system, thus preparing the stage for change in the pattern of electricity production.

However, as depicted by the Electricity Commission's statistics of the supply industry, little change in the distribution pattern took place for twenty-five years. Such changes as did take place were only in local detail due to old stations in town centres being closed down and replaced by new on the urban periphery. In fact, contrary to what might be expected greater concentration of production took place, assisted and promoted by the commissioning of the Grid System, which caused many small stations to be closed whilst new larger stations were in almost every case locationally related to some urban centre.

Nationalisation, however, marks a change in the industry's economic geography, although these geographical changes would inevitably have come had the industry continued in its pre-existing system under national supervision. To depict the future pattern, however, output can no longer be employed, so use is made of station capacity, which bears a close similarity. At present the pattern is only partly changed but by 1960, a considerable alteration will probably have been wrought with the completion of the first stage of the 275 kV system. Its salient feature is the line of large stations in the eastern midlands, planned for sites on the River Trent, and thus forming the main axis of future electricity production in Britain. If the plan is fully implemented, some 4,700,000 kW of plant, producing more than 25 thousand million units annually, should be in existence along the river by 1965-70.

Factors in the change

In attempting to seek reasons for this change, and the earlier constancy of pattern, many factors merit attention, although basically progress in plant design and comparative costs of transmission outweigh all others. It should be borne in mind, however, that the Grid System was partially responsible, as, constructed to accommodate a pre-existing pattern, it tended to perpetuate. Moreover, its commissioning resulted in reduced requirements for emergency plant, thus leaving the former spare plant to be brought into use as the demand increased during succeeding years. In this way the grid may be deemed to have postponed the need for a serious review of locational policy, until the years before nationalisation when the C.E.B. initiated the changes now taking place.

Fundamentally, however, economies in works costs resulting from the increased efficiency of generation in steam stations, yielding, at the time, greater saving than would be obtained by changing from transport of coal to transmission of energy, were chiefly responsible for the earlier stability. Moreover, plant, in general, had to be designed and located to operate, initially when new on base-load and then later on mid and finally peak-load. As it grew older and became more costly to run, since it spent only a small part of its life on base-load, it was more economic for plant to be located near its intended market than near the source of its coal. As it became no longer possible to effect substantial improvements in plant efficiency, attention was then turned to transport costs as the only remaining field for major economies, and the cost structure of the industry was thus forced to take into account both market and coalfield locations. This has brought the result that large new base-load stations to operate as such virtually to the ends of their lives are being established on the Trent and elsewhere in Yorkshire near low-cost, expanding inland coalfields providing an increasing amount of coal for electricity generation, to enable energy to be transported more economically as electricity than as coal to the outer parts of London, Southern England and South Lancashire.

Light Current Engineering

In the field of light current electrical engineering, the topic of semi-conductors was much in evidence, being discussed in the Mathematics and Physics, Chemistry and Engineering Sections. In the former, R. A. Smith (Ministry of Supply) ranged over the whole gamut of semi-conductors, transistors and photo-cells, showing that this group is not only important for its contribution to electronic techniques but providing the means to discover the mechanism of electricity conduction in solids and of the binding together of atoms to form solids. In their practical use, they have been mainly employed, so far, as low power rectifiers, as the basis of microwave receivers for radar, as the sensitive elements in infra-red photo-conductive detectors and now as the transistor. In the latter connection, the possibility that a substantial number of vacuum valves could be replaced by transistors, gave rise to a large industrial research effort which has led to a rapid advance in understanding of these materials.

As is now widely known, current in semi-conductors may be carried in two distinct ways—by electrons (in n type materials) and by "positive holes" (in p type materials). The practical importance of semi-conductors, however, stems from the ability to control the number of electrons and holes, illumination with light, for example, effecting an increase in the number of carriers. As a result, a certain group of semi-conductors can be used to make sensitive photo-cells operating out to a wavelength of 8 microns, thus extending photo-electric detection and recording techniques to the infra-red spectrum. The number of carriers may also be varied by "injecting" new carriers at a point of contact—the basis of the point contact transistor—enabling power amplification to be obtained and the device to be used in much the same way as the triode valve. The point contact transistor, however, has certain limitations many of which can be overcome by using junctions of p type and n type semi-conductors. Capable of giving efficient rectification, p-n functions may ultimately replace most low power rectifiers now in use, whilst, as a transistor, avoid the use of point contacts giving greater reliability. An important use for the p-n junction is as a photo-electric generator, turning light energy into electrical energy. A small power unit can be made in this way, capable of powering a wireless set employing transistors, moreover the recent discovery of carrier extraction (the inverse of carrier-injection), in which carriers in a semi-conductor may be removed by applying an electric field, opens up further possibilities for exploiting semi-conductors, particularly the use of germanium transistors at much higher temperatures than at present.

Further discussion of germanium was continued in the Chemistry section by Mr E. G. James (General Electric Co.) who was mainly concerned with its scientific and industrial applications. As already mentioned germanium's industrial usefulness derives from its conductivity being controllable. In order to produce such germanium, it has first to be purified to the extent that impurities occupy less than one part in 100 millions. To the germanium are then added controlled amounts of specific impurity to impart one or other of its characteristics—p type or n type. It can then be made into diodes or triodes of either the point contact type (usually made with n type) or the junction type. In the latter case, triodes may be either p-n-p types (having a layer of n type germanium sandwiched between two p type faces) or the reverse, n-p-n types.

Surveying their possible applications, point contact diodes, now well established, are employed as alternatives to thermionic diodes in lower power electronic and telephone circuits. Junction diodes, however, as they can be made with a relatively large area, are capable of rectifying large powers. Current carrying capacities of up to 3,000 A/sq in. have been attained. Of the triodes, the point contact type has characteristics similar to those of the thermionic triode but certain important differences enable novel circuits to be developed. In particular, such circuits are eminently suitable for electronic computors. A more recent development is the junction triode, capable of higher amplification and operation at potentials down to 0·5 V, but limited, so far, by its lower maximum operating frequency. Its existence in the two distinct types of n-p-n and p-n-p, however, has led to the development of new amplifying circuits employing fewer components.

Extracting Germanium from Flue Dust

As is often the case with elements of this kind, germanium does not occur in large quantities in nature and in Britain the largest mineral deposits amount to only 20 parts per million in one of its few indigenous sources—coal. An account of extracting germanium, and its neighbouring element gallium from this source formed the basis of another interesting paper in the Chemistry section. Presented by A. R. Powell, F.R.S. (Johnson Matthey and Co.), the paper reviewed the history of its extraction from the discovery in 1930, by Prof. V. M. Goldschmidt, of Göttingen University that coal from a British seam contained these elements. It was soon found that the only material from which they could be obtained economically was the flue dust derived from the combination of producer gas in certain gasworks. Such flue dust may contain up to nearly 3% of germanium and 2% of gallium, although usually it is only about 0·5%. In its large-scale extraction, flue dust from a number of gas works is accumulated until sufficient is available for smelting. After smelting, the metal undergoes a number of refining processes to produce germanium powder which, after melting into an ingot, is finally purified by zone melting.

Increased efficiency in utilising the nation's fuel resources provided a common theme for a number of different papers, of which two were directly concerned with coal as the fuel. Discussing modern coal processing in relation to the problem, Dr W. Idris Jones (National Coal Board) stated at the outset that it should be possible to increase the overall efficiency of coal utilisation in the U.K. from the current 35% to possibly 50% by the end of the century. However, the most serious factor in coal utilisation was the relative and absolute decline in the production of coking coals for the coking and gas making industries at a time when both industries were expanding. Moreover, as most of the coal mined in years to come will be low rank non-coking or feebly coking types, there is a need for studying the processing of these coals in such a way that they may be used for the same purposes for which coals of higher rank are now used.

Research by the N.C.B. has found that such low rank coals can be pre-treated and briquetted, the briquettes being then carbonised to form efficient smokeless fuels. However, in practice many of these coals cannot be directly carbonised and moreover require to be cleaned initially to remove mineral material. Most of the coals then require to be submitted to a mild oxidation with air to prevent its swelling and agglutination before undergoing low temperature carbonisation.

On the related subject of town gas production by gasification processes, F. J. Dent (Gas Council) was primarily concerned with the greater exploitation of coal for gasification so that the use of gas could be extended to general heating purposes. As in the case of smokeless fuel, however, the most suitable type of coal for gasification by the carbonisation process is becoming increasingly scarce and for this reason a large increase in the production of gas from coal seems to require some other process. Research indicates, however, that a suitable process is soon to be forthcoming, in which the coal may be gasified completely by following an initial thermal decomposition by a reaction of residual carbon with steam. Based on the Lurgi process, it also provides a sulphur-less residue which could be used as a fuel for power stations when the flue gases would no longer call for treatment.

Methane Drainage

As part of this effort being made to utilise fully the nation's fuel resources, increasing attention has been paid recently to the use of natural gas. Its chief constituent is methane which, as "firedamp" is encountered in varying amounts in coal mines, and the drainage from these workings was outlined by J. G. Bromilow and J. H. Jones (National Coal Board). Methane drained from coal bearing strata not only makes for increased safety in working the coal but provides a supply of gas of considerable commercial value. At the Haig pit, Whitehaven, for example, so much methane was emitted that 10 tons of circulating air was required for every ton of coal mined, whilst the amount of methane discharged from the pit in 1948 totalled some 4 million cu ft, equal in heat value to 150 tons of coal or 20,000 gallons of petrol. Over the whole country, ultimately about 50 million cu ft of pure methane a day could be drained from power stations.

It is but a short step from fuel efficiency to the allied subject of house heating and its attendant evil, atmospheric pollution, a topic dealt with by Dr A. Parker, C.B.E. (D.S.I.R.), in the Physiology section. It is a problem of some magnitude for which, as statistics and conditions show, the domestic grate, burning household bituminous coal is largely responsible. To overcome the smoke menace from this source, the only solution which at the same time would not lead to greater fuel consumption and would be most acceptable to British tastes was the development of a balanced market for electricity, gas and coke to replace bituminous coal. This would require a greatly increased production of coke and suitable appliances in which to burn it, although the latter are already available. Appreciable reduction of sulphur dioxide from domestic chimneys, however, could only come from the use of gas or electricity exclusively for domestic heating.

Easy Handling of Coal Wagons

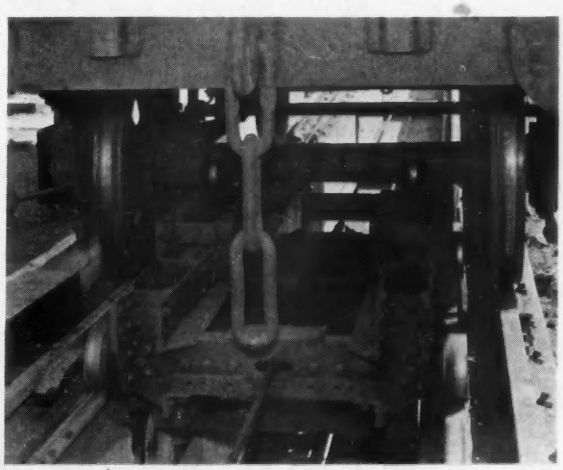
Traverser Mechanisms in use at Leicester and Dalkeith

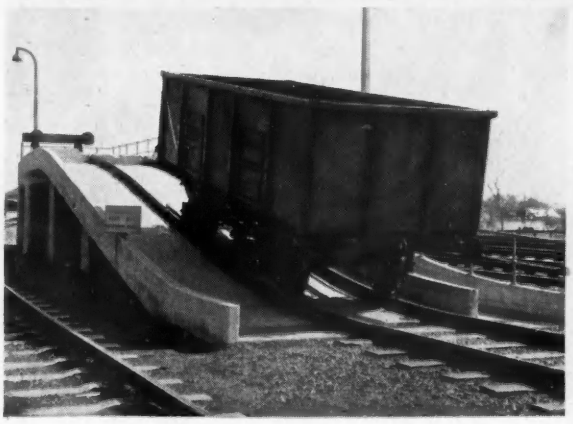
RECENTLY introduced into Great Britain by Mitchell Engineering Ltd. is a mechanical system of handling trains of wagons, which, it is claimed will greatly simplify the problem of breaking up and marshalling trains at power station sidings, colliery sidings and large works. The system is already in use at two important sites, one at the B.E.A.'s power station at Leicester and the other at the National Coal Board's preparation plant at Dalkeith.

The power station installation was built because the Mitchell system has the great advantage of occupying considerably less area than is required for conventional working. At Leicester, the siding area was restricted, and the added coal requirements due to the extension of the station could not be handled on the existing system.

The principal feature of the method lies in the use of a traverse conveyor, whereby trucks can be moved laterally as required and placed on any one of a number of parallel tracks. At Leicester there are three parallel reception sidings and one return siding. Trucks are taken

The Leicester installation is shown below. Top left is the control desk with below it a wagon on the "kick back". On the right are pictures of the booster mule with, top, a mule engaged with wagon axle and below it, an empty wagon on the tippler





from any one of the reception sidings by the traverser and transferred to the fourth siding which contains a wagon tippler at its lower end, followed by a booster track up a gradient some 250 ft long. The remainder of this track has a rising gradient terminating in a "kick back" which connects back into the three reception sidings.

The wagon traverser is driven by an electric winch, which may also be clutched into a separate mechanism, carried on he traverser, which operates a small trolley carrying arms. These arms engage with the wagon axle and draw the full wagon from the sidings on to the trolley. This runs on a narrow gauge track which is laid within the 4 ft 8½ in. gauge track on the traverser.

Operation

The reception sidings are on a down grade so that wagons descend under gravity toward the traverser. They are left at rest against a wagon stop which operates on the front axle of the first wagon. This is known as the first stop. Just over one wagon length beyond this stop and a few feet short of the traverser pit is a second stop. The siding to be worked is pre-selected by the operator in a control cabin next to the tippler. As soon as he presses the start button the traverser moves from its position opposite the tippler track and stops opposite the selected siding. Immediately the traverser stops, the motor is re-energised and clutched in to operate the trolley which moves in the direction of the second stop. By a mechanical trip, this movement of the trolley breaks the toggle holding the second stop, thus allowing one wagon to roll toward the traverser. Almost instantaneously the arm of the trolley engages with the front axle of the wagon, and the motion of the trolley is stopped and reversed. This movement permits the wagon to be brought on to the traverser and correctly located. A two-axle counter controls the reset of the stop into a position to arrest the next full wagon.

As soon as the wagon is correctly located on the traverser, the motor stops and is re-energised and clutched into the main cross travel motion in the reverse direction to the outward travel. The traverser, carrying the loaded wagon, returns to its position opposite the tippler track. As the traverser moves off, it actuates a switch which releases the first stop, and so allows the next truck to run forward into position. The two-axle counter again operates to restrain the remainder of the wagons in the siding by means of resetting the first stop.

On arrival at the tippler track the traverser stops, the trolley is again energised and pushes the truck on to the tippler, and simultaneously this truck pushes the previous wagon, already weighed and emptied, on to the booster track. The weighing is carried out automatically by the operator, who, when a wagon is on the tippler, first presses a "weigh-full" switch and, after the wagon has been emptied, a "weigh-empty" switch.

From the tippler, a down gradient ensures that the wagon runs to the bottom of the booster track. The arrival of each empty wagon sets the booster winch in motion by depressing two pairs of track switches. The booster, consisting of a trolley with a pair of arms which engage with the rear axle of the wagon, is rope hauled by a winch located below rail level at the top of an incline. This winch accelerates the wagon up the incline and the wagon, on reaching a predetermined speed, is freed and continues under its own momentum to the "kick back." This is a short steep hump, up which the wagon runs, is brought to a standstill by gravity, and then descends backward to the turnout which comprises spring loaded points. From this position it is automatically directed by the preselection system to the rear of the standing trucks in the reception sidings.

A number of automatic safeguards have been incorpoporated to prevent any possibility of mal-operation and to prevent serious damage. Slippers are fitted on the booster incline to arrest any wagon running back toward the tippler. These prevent damage in the event of a booster failure, and consist of a pair of wedges or skids mounted outside the running rails with a mechanism inside them so that the wagon can pass freely on its upward travel. Should the wagon return, the wheel flanges lift the wedges on to the rails to act as chocks beneath the wagon wheels. The chocks are then free to slide and stop the wagon in a short distance.

The gradient above the top of the booster track is shallow enough to stop any wagon that fails to reach the "kick-back." In the event, however, of a free-running wagon running back, a spring loaded turnout is provided to divert it into a sand trap.

Electric interlocks are also provided to prevent motion of the traverser before the previous wagon has been tipped, returned to lower position and weighed empty and until, in addition, the booster shuttle is at the base of its incline and the "kick-back" and return points to the reception sidings are clear of traffic.

The whole of the operation is performed by electrical control by one operator situated in a cabin at the tippler end of the traverser pit, the only other non-automatic functions being the coupling and uncoupling of trains. Thus two men can supervise the complete unloading and weighing of coal at 800 tons/hr, an achievement which would be impossible in a more conventional system.

Dalkeith Installation

The installation at Dalkeith utilises some seven tracks, and each track is used with traversers to pick up the right grades of coal for the correct destination. This N.C.B. central coal preparation plant handles the washing and screening of the entire output of coal from ten collieries. The washery is capable of a hourly output of 400 tons, and the Mitchell wagon-marshalling system is designed to handle this output in ten-ton wagons, a through-put of 40 wagons/hr with each wagon weighed. The equipment consists of an empty-wagon traverser which distributes wagons from two wagon tipplers on to eight coal loading tracks. Haulage mules take the wagons along the loading tracks to boom conveyors which load on the coal. The wagons are then propelled toward the stops at the marshalling traverser. When a loaded wagon is ready, this traverser accepts it, weighs it and then discharges it to the siding apropriate to its destination.

It must be remembered that in this case the functions are more complex than those at Leicester. The incoming coal, after tippling, proceeds to the washing and screening plant and is then redistributed as graded coal across the eight tracks. The wagons are then made up into trains suitable for various destinations. The empty wagon traverser is consequently controlled by an operator who has a cabin on the traverser itself, and he selects whichever of the two empty wagon input tracks is required, and delivers the empty truck to one of the eight loading tracks. Once on a loading track the wagon descends into a dip where it meets other empty wagons and comes under the control of two men operating the boom conveyor loading equipment. Mules, under the control of these operators, and running on rails within the standard way, descend into the dip and pick up the lowest truck bringing some empty ones in front of them. These can then be inched under the loaders.

Electricity —and Aircraft

DISPLAYS AT S.B.A.C. FARNBOROUGH SHOW

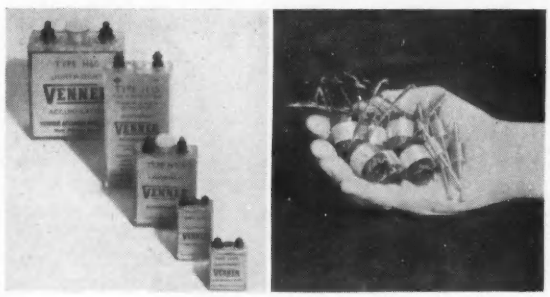
ALTHOUGH public interest in the S.B.A.C. Exhibition and Flying Display is mainly concentrated on the aircraft themselves and their performance, there is much to be seen in the exhibition of component parts and ancillary equipment.

Aircraft batteries, for example, have particularly arduous duties to perform under conditions of temperature seldom encountered on the ground. Chloride Batteries have now a group of new Exide products for special aerial duty, among them a remarkable 3-cell lead-zinc primary battery for radio sonde use, and a 4 Ah unspillable battery to give high output at low temperatures to operate cockpit canopy-jettison gear, v.h.f. equipment and other devices. From Venner is the lightweight silver-zinc accumulator with its exceptionally high power/weight ratio. The same company is showing various time delay switches and relays. The Peto and Radford new 24 V starter battery for jet engines utilises Porvic enclosed negative plates and has a capacity of 25 Ah for a weight of only 38½ lb.

Among the numerous items displayed by the British Thomson-Houston Co. is an electronic ignition tester for checking multi-cylinder aircraft engines. This displays the behaviour of each sparking plug circuit on a 3½ in. cathode ray tube, and all spark images can be shown concurrently if desired. The tester is entirely self-contained and only weighs 45 lb. It can operate from 200/250 V a.c. or can be fitted with a power pack for 24 V d.c. A wide range of aircraft motors by BTH is also on view, together with a small gas-turbine alternator unit which can provide electrical power in an aircraft independently of the main engines.

Micro-switches—two hundred different types of them—are prominently shown by Burgess Products, and among them are several new models including prototypes of a high temperature Switchette, suitable for temperatures up to 300° C, and the Mark 5 Universal Switch. Salford Electrical Instruments Ltd are also in the switch field with their Klixon thermal circuit-breakers which are made in a series of ratings from 5 to 50 amps. They weigh less than 2½ oz, are highly shock-proof and will withstand the most exacting climatic conditions.

Miniaturisation in aircraft is exemplified by these Venner silver-zinc batteries for aircraft use. On the right is a handful of BTH motor rotors and stators for aircraft use



Aerodrome workerwearing G.E.C Breast-Battery lighting set for night refuelling etc.

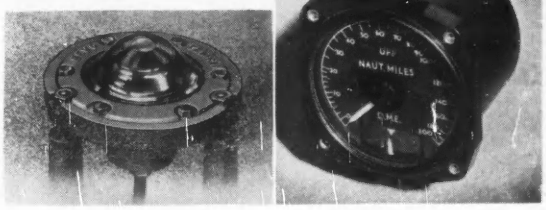
Communication and Navigation

Mullard Ltd., have a stand devoted to valves, tubes and transistors and a second stand which features the new communication receiver GFR 563. This has a continuous coverage of 210 to 540 kc/s and 1·45 to 32 Mc/s in six ranges. A new 1,000 Mc/s airborne interrogator, the D.M.E., has been developed by Ferranti. In addition to giving distance information, this interrogator has facilities for the incorporation of homing circuits in the same unit.

A remarkable h.f. transmitter receiver is the Marconi AD 307, a multi-channel transmitter/receiver primarily designed for pilot operated radio telephony service. On the basic equipment 200 crystal-controlled channels are available, but alternative drive circuitry, using crystal economiser techniques, will provide 44,000 channels in the frequency band 2—24 Mc/s. Output of the set is 130 watts.

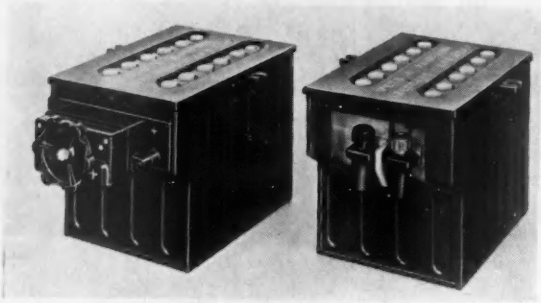
Out of the numerous exhibits provided by Standard Telephones and Cables Ltd., the Precision Approach Airfield Radar is of interest in showing how pilots can be "talked-down" by a ground operator to make a safe landing during inclement weather. The equipment operates on a wavelength of 3 cm and has a range of about 10 miles. Latest version of the STR 30 A radio altimeter is the STR 30 B with an accuracy of down to 2 ft. Height ranges are 0—500 an 0—5,000 ft.

Revo's cast iron watertight taxiway light with toughened glass lens to stand a load of 1,500 lb/sq. in. with right, Ferranti's D.M.E. Interrogator presentation



Plessey are showing a windscreen de-icing controller, and, in their radio exhibits is the F.S.K. transmitter drive unit (PVT 90) supplying an eight-channel, crystal-controlled frequency keying drive to an h.f. transmitter. This used in conjunction with the PVR 80 four-channel diversity F.S.K. receiving terminal forms a comprehensive R.T.T. installation.

The stand of E. K. Cole, Ltd., is this year devoted entirely to the Ekco airborne search radar equipment,



Two alternative versions of the new Peto and Radford 24V Battery produced to cater for jet-engine starting

which has already been installed in a number of aircraft, and has been fitted in the prototype Bristol "Britannia." This equipment is primarily designed to give the pilot of the aircraft adequate warning of dangerous cloud formation and thus enables him to choose the safest route under conditions of bad visibility or at night. Warning of high ground in the path of the aircraft and "map painting" are additional important functions.

Airfield Equipment

New and improved designs of catering and lighting equipment for aircraft and new lights for airports and airport services are among the exhibits of the General Electric Co. A new water-heater for installation in aircraft will be shown with a loading of 5 kW at 28 V. Ovens for reheating pre-cooked frozen food include a two-compartment model, recently supplied to Trans-Canada and Trans-World Airlines. The G.E.C. breast battery lighting set is especially useful for night fuelling of aircraft and is certified as intrinsically safe in pentane, butane, hexane, heptane, acetone, carbon monoxide, cyclohexane and benzene atmospheres. A new item of airfield lighting is a flush mounting runway light designed to meet the increasingly rigorous conditions imposed when lights of this type are run over by aircraft with tyres inflated to high pressures. Revo Electric Co. have a range of lighting fittings specially developed for airfield use, and Elliott Bros., who are showing various airborne instruments including the Jindivik Pilot for high-speed pilotless aircraft, have several transducers and measuring instruments for use in ground testing.

Power units for ground use are shown by Westinghouse Brake and Signal Co., including the "Westruk" No. 960 giving 500 amp, 28 V d.c. for continuous use and 2,000 amps for starting. Auto-Diesels are also showing ground power units which will be seen in operation.

Cables designed to meet the wide range of conditions experienced in modern aircraft are to be seen at the British Insulated Callender's Cables stand. These include Glasil (−50° C to +150° C) and Glasef (−75° C to +250° C). A cable resistant to synthetic lubricating oil is "Nypren."

Floor Heating for Flats

MODERN methods of building large blocks of flats make electrical floor heating techniques particularly attractive in many particulars. There has thus been widespread interest in the decision of the Kirkcaldy Corporation to use "Panelec" floor heating in a prototype eight storey block of 48 flats. The South East Scotland Electricity Board has co-operated closely with the Burgh Engineer in planning this trial, and it is understood that the Department of Health has now approved the proposal.

The flats will not be provided with fireplaces or chimneys, and will be entirely electric. Two incinerators will be installed for combustible waste disposal. The provision of a lift will give easy access to all floors. In each flat the living room and the hall will have "Panelec" floor heating which is designed to provide an equivalent comfort effect of 60° F. The Kirkcaldy Corporation are to provide an electric fire of the radiant "coal effect" type in the living room of each flat. Suitable socket-outlets will be provided in the bedrooms so that tenants may install electric fires if desired. Electricity for floor heating and water heating will be made available on the South East Scotland E.B. "Off-peak" tariff at an inclusive rate of 0·7d. per kWh during the hours of 7 p.m. to 7 a.m. with a midday boost from 11.30 a.m. to 3.30 p.m.

Each flat will be provided with a 30 gallon hot water storage cylinder fitted with a 3 kW immersion heater and thermostat time switch controlled on the same circuit as the floor heating. The combined electricity consumption for floor heating and water heating will be separately metered in each flat; in order to facilitate meter reading without disturbing the tenants the Burgh Engineer has arranged for the meters to be installed in the entrance vestibule. There will be a drying room on each floor in which grilles will be provided and it is intended to experiment with natural ventilation for drying purposes, but in the event of this method being unsuccessful electric drying cabinets will be installed. Each flat will be provided with an electric cooker.

The heat losses on the ground floor, intermediate floors and top floor are, of course, different and the table gives the proposed floor heating loadings. It is estimated that

	3 Roomed Flats	2 Roomed Flats
Ground Floor Flats ...	3 flats at 4·1 kW	3 flats at 3 kW
Intermediate Flats ...	18 flats at 3 kW	18 flats at 2·6 kW
Top Flats	3 flats at 4·85 kW	3 flats at 3·75 kW

the cost of floor heating for a season of 210 days will average approximately £14 per annum per house and the water heating at £10 per annum per house.

The capacity of an adjacent substation will be increased by 300 kW in order to supply the flats and the main electricity service will be taken to a room on the ground floor. Six pairs of vertical rising mains will be taken from this central position, each pair supplying 8 flats. One of each pair of rising mains will supply the ordinary peak load requirements such as lighting, additional heating, cooking, wireless, etc. The other will supply the "Off-peak" loads and will be time switched at the service position on the ground floor.

Each block of flats comprises a reinforced concrete frame structure with 12 in. no-fines walls or panels. Intermediate floors are of 5 in. pre-cast bison slabs overlaid with 1 in. paper-bonded glass-wool insulation, compressed to ½ in. and finished with screed to a depth of 1⅞ in. The final covering is ¼ in. Marley tiles. The glass wool is present mainly for sound insulation.

notes on wiring

by Megohm

I HAVE in the past made known my feelings on the shortcomings of architects and house planners with regard to providing an adequate number of socket-outlets in the ordinary-sized house. All too often one finds this fault in newly-built houses, and the result is a mass of tangled flexible cords feeding different pieces of apparatus or the additional socket badly installed by an amateur. It was, therefore, very refreshing to find recently in one of the architectural journals a two page advertisement dealing with sockets and their correct siting. This advertisement was inserted by the British Electrical Development Association and is worthy of study by all in both the architectural and electrical professions.

Service by E.D.A.

I have no doubt that the service rendered by the E.D.A. is well known to many consultants and contractors, but I feel that there may be those who are not fully familiar with this organisation. The many attractive booklets issued by the E.D.A. should be invaluable to those dealing with clients who are being introduced to electricity for the first time. Now that the supply cables are penetrating into the rural areas there must be many new consumers, and the benefits of electricity must be pointed out to them at the beginning. I understand that these booklets are principally produced for the use of housing authorities, architects and builders, but they can be obtained by contractors.

This particular advertisement which attracted my attention gives details of the recommended number of sockets per room, their correct siting, the many portable appliances which can be used in the homes, and illustrates the 2, 5, 13 and 15 amp plugtops. A special note is made regarding earthing facilities and the reference to flexible cords is very interesting. It is rightly pointed out that the flexible cord is the most vulnerable part of the installation and should be regularly inspected for defects and replaced—*never patched*—when any are noticed.

Reference is also made to installations in the U.S.A. where it is common practice to install sixty-five socket outlets in an average six room house, and even the mass produced two bedroom house has forty-five! I should be interested to hear just what is connected to them all, as it appears to me that these numbers are rather in excess of requirements.

I feel sure that the ladies in the electrical world would be interested in the E.D.A. booklets describing the planning of kitchens. The accent is on labour-saving devices and the general trend is towards built-in apparatus. Whilst I agree that built-in apparatus is very neat and tidy I have, on occasions, found it extremely difficult to service. I also discovered that it hides a multitude of sins. Badly fixed accessories and long lengths of flexible cord are frequently found in such situations. Another important point is emphasised, and this is *ventilation* in the kitchen. This is very often forgotten, or considered unnecessary, and results in condensation on the walls.

Kitchen installations, in my opinion, require much planning and great care must be taken with the siting of sockets and other electrical details as there is always the water services, and perhaps gas services, to contend with. Care in siting socket outlets can assist in keeping to a minimum the length of flexible cords on kettles, irons and other appliances.

Useful Tool

I recently visited a site where the electricians had to lift numerous floorboards, and I found them making full use of a novel tool. Usually when such a job is in progress, the need arises to cut a floorboard near to a joist and then fix a fillet to carry the board afterwards. This particular saw allows the board to be cut immediately over the joist and thus does away with the fillet and deletes the possibility of the board sinking after refixing.

The tool consists of a metal plate with an indentation in which the knee is rested to apply pressure to the saw. The blade is of the circular type some 4 in. in diameter and fits on to the front of the plate. Attached to the saw, by means of nuts and bolts, is a handle. Underneath the plate is an adjuster screw and two spikes. The adjuster screw is set to the thickness of the floorboard being cut. The two spikes, when the weight is applied, stick into the floor and prevent the whole tool from sliding. Where the saw is used on polished floors, another plate, with rubber pads fixed to it, can be clipped over the spikes and so prevent damage to the boards.

The method of operation is that the joist is located and a line drawn on the board where the cut is required. The blade of the saw is then placed on the line near to the edge of the board and the knee placed on the plate. The handle is then worked backwards and forwards and the saw blade is driven into the board. It may be necessary to move the saw once or twice in order to cut the board completely across. The operation is quickly carried out and a neat cut results. Of course, it is impossible to avoid cutting into the boards either side of the board which is being cut, but damage done to them is small.

The saw blade can be moved into four positions as each section of teeth become blunt. In this way use of the entire saw blade is obtained over a period. I was unable to ascertain if the blade could be set and sharpened in the normal fashion but I see no reason against it. I was impressed by the speed at which the boards can be cut. The operative had used the tool with care for some months and the original blade was still in use. I must add, however, that he stopped using the saw to cut the tongue of the boards because of the very hard wearing effect this operation had on the blade. I cannot see how this could be overcome easily because of the difficulty in clearing any grit in between the boards. Perhaps the saw blade manufacturers can help here and produce a really tough saw blade which could stand up to the job.

PUBLICITY MATERIAL FOR NEW SEASON'S SALES

IN spite of the popular belief that we deserve some brighter weather in the coming weeks to compensate for the dull, wet and miserable days we have experienced this summer, the fact remains that the daylight hours are fast becoming shorter. The consequence, of course, will be a greater reliance on artificial illumination and the indications are that there will shortly be even keener rivalry among lamp manufacturers to persuade the public that a particular brand is the best. Details of manufacturers' autumn lamp publicity campaigns show even greater efforts this year in the art of persuasion.

The biggest campaign they have planned since the war is being launched by **Crompton Parkinson Ltd.** Space has been booked during the next six months for a very substantial number of advertisements in the national dailies, most Sunday newspapers and a long list of weekly magazines and trade journals. Objective has been to make the design of media simple but arresting. Slogan chosen for this autumn is "Don't just say lamps—say Crompton," emphasis being laid on the persuasion of customers to buy a particular lamp instead of just a lamp.

Dealers will be provided with a variety of supporting display material. Of particular note is the Crompton flashing sign designed to give a before-and-after effect. The messages and cartoons embodied in the sign can be altered easily. In addition there will be a mobile display, cut-out showcards, catalogues, and a redesigned carton.

It is generally maintained that the housewife buys the lamps for the home. In consequence the **General Electric Co., Ltd.'s** campaign for Osram lamps is directed mainly at her, and advertisements in national and provincial newspapers and magazines have been designed with that policy in mind. A special approach is also being made to business executives. Basic designs of material follow last year's. The lamp and moon poster is being retained and the same theme used in other forms. The "little people" will be extending their activities and appearing in new situations. These posters will be incorporated in ready-made displays available to dealers, and in this field also there is an attractive centre-piece comprising a black-and-white print of a baby's head and shoulders, with the slogan "better light for precious sight."

Publicity material for dealers this autumn include (left to right) the G.E.C. cut-out of one of the humorous characters; Philips' new feminine attraction, Miranda; a display unit emphasising BTH's "Lighting to Measure" booklet; and the counter folder for Metrovick Silverlight lamp

Additional items produced by the G.E.C. include a newly designed illuminated sign, a counter cloth for photographic dealers featuring photo-flash bulbs, leaflets, catalogues and brochures. New sales aids have also been produced for vehicle and cycle bulbs.

Four-colour showcards featuring motor car and cycle lamps are also among media produced by **Philips Electrical Ltd.,** who have a wide range of material available for a variety of products. Photoflux flash bulbs have a new counter display featuring a competition for amateur photographers, and for dealers in poultry and pig farming areas there is a new showcard for infra-red livestock rearing units. The placing of printed advertisements by this company also indicates an appeal to the ladies for bookings have been made in women's magazines with a total readership of nearly 10 millions. Focus will be on the Argenta lamp. The life-size girl cut-out Philipa has been joined this year by Miranda.

The new campaign of **Siemens Electric Lamps and Supplies Ltd.** is aimed primarily at the domestic consumer. Planned on a regional basis, the backbone of the campaign is personal contact with wholesalers and retailers by a team of sales promotion representatives. To coincide with this, advance information of promotional intentions will be distributed to local dealers and wholesalers. There is a plentiful supply of point-of-sale aids available in the form of display material, showroom exhibition pieces and a window dressing service. A special curved panel suitable for window or showroom tells which lamps should be used for particular locations. Another display illustrates good lighting in the main rooms of a house, explained by an adjoining panel giving factual data. There are also attractive new cut-outs, transfers and wall posters.

"Stick 'em up Dad, everywhere," is the arresting message which **Metropolitan-Vickers Electrical Co. Ltd.,** are giving to the householder this season to advertise their lamps, and particularly the Silverlight lamp. The exhortation of a youthful cowboy is depicted in a cut-out printed in ten colours, a showcard and on small counter leaflets. A general purpose display unit with three extending panels is also available for window backgrounds. The same firm has also produced a wide variety of explanatory brochures, catalogue, leaflets and folders.

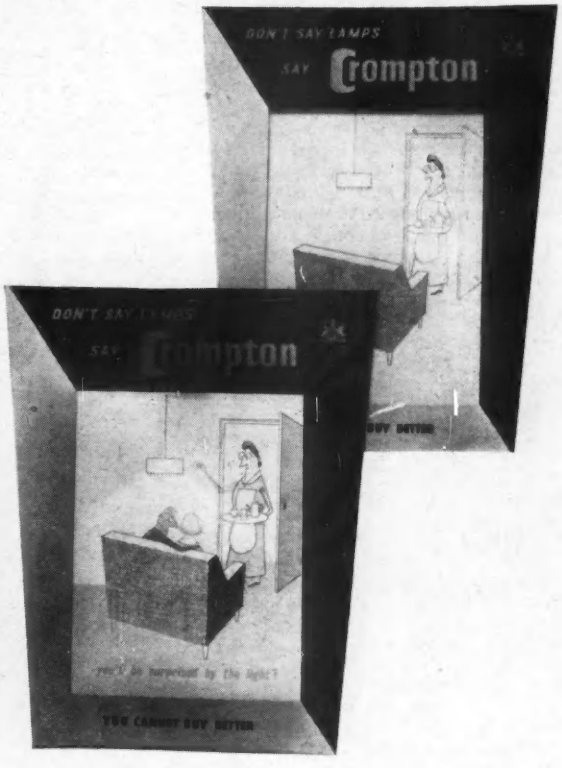
Four full-colour showcards are in the forefront of dealers' aids to support Press advertising by **Ekco-Ensign Electric Ltd.** An item of special interest available from this company is a large counter and window display unit featuring their 2 ft fluorescent batten fitting.

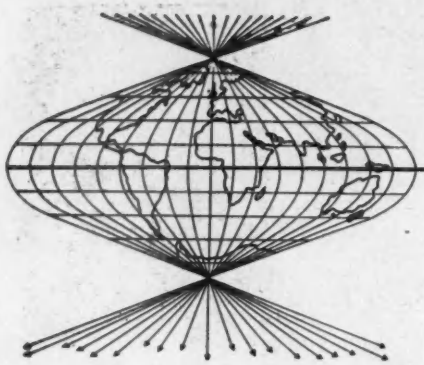
Below are examples of this season's showcards produced by Edison Swan and Ekco Ensign. Right is the new "before and after" scene advertising Crompton Parkinson's lamps

Siemens' table lamp cut-out should attract a deal of attention

Particular attention is being paid by the **British Thomson-Houston Co., Ltd.,** to their Mazda Queen of Light Beauty Competition, and the new edition of their "Lighting to Measure" at this, the beginning of their autumn campaign. The former is being staged at various centres providing dealers with an excellent opportunity of tying up their displays with the local event. All dates are now fixed. This month the heats will be at Manchester, 10; Cardiff, 20; Glasgow and Newcastle, 21. Next month they will be at Belfast, 6; Streatham, 8; Sale, 15; Aberdeen and Bristol, 19. In November at Birmingham, 1; Liverpool, 3; London, 4; Nottingham, 8; Tottenham, 17; Leeds, Manchester and Edinburgh, 19; and at Sheffield on 3rd December. The "Lighting to Measure" booklet, which shows how housewives can improve lighting in the home by using a tape measure and following instructions, has been revised. Dealers' display aids will be available shortly.

The **Edison Swan Electric Co., Ltd.'s** advertising will be concentrated at the point-of-sale. Material now available includes window bills, four showcards and counter cards, a centre-piece, and a folding display piece.





OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Bridge River Extended

A fourth 45,000 kW generator has been placed in service at the Bridge River power plant of the British Columbia Electric Co. bringing the capacity of the station to 180,000 kW. Mr T. Ingledew, vice-president and chief engineer of the company has said that Bridge River now produces almost as much energy as the company's entire mainland system did in 1947. Work is also proceeding on the project to raise the height of the La Joie storage dam on the Bridge River a further 57 ft, which will double the capacity of the reservoir.

Work in Alberta

Preliminary construction has been started by Calgary Power Ltd., on a new steam power station on the shore of Lake Wabamun, about 40 miles west of Edmonton, Alberta. Completion of the station is scheduled for late in 1956. Initially the plant will have one 88,000 h.p. generator, but subsequently three more units will be added. The boiler plant will burn natural gas at the outset, but it can be converted to coal-burning if required. The Wabamun plant is, in fact, being designed to utilise the low grades of coal produced in the Wabamun area, but the installation of the coal firing and handling equipment is being deferred for the present, with a saving of over $1,000,000 in capital cost. Until oilfield gas from the Pembina or other nearby areas is available in sufficient quantity to meet the plant's requirement it is proposed to draw on adjacent gasfields. The company plans to substitute coal firing for gas as soon as other markets open up for the oilfield gas.

CENTRAL AMERICA

A Scheme for Honduras

In Honduras consideration is again being given to the proposed Rio Lindo hydro-electric project. An American firm of consulting and constructional engineers, the Kuljian Corporation, has been instructed to bring up to date the previous surveys carried out on the scheme. It seems that the Banco Central is actively interested in keeping the project alive, and has given an assurance to the Government that it would be able to arrange the necessary finance. It is evident that this major hydro-electric project will probably obtain high priority in any economic development programme, but it will probably be some months before any definite decision is made.

BRAZIL

Expanding Supply

The official opening recently of the tunnel which is to carry water down to turbines in the Salto Grande hydro-electric scheme indicates that this, the latest of Brazil's power projects, is nearing completion. Initially the capacity of the station will be 104 MW. At the ceremony, it was announced by CEMIG (Centrais Eletricas de Minas Gerais), who are constructing the power station, that the tunnel, which runs for 4,600 metres, is the largest in South America. The Salto Grande project, which should be completed by 1955, is a main thrust in the efforts being made to provide more power for the State of Minas Gerais which, in 1952, possessed only 150,000 kW and which, by 1956, should have nearly 450,000 kW at its disposal. Regarding the provision of electric power for Sao Paulo State, the recently published report for 1953 of the Cia. Paulista de Forca e Luz gives some interesting notes. This company, which is one of the subsidiaries of the American and Foreign Power Group, provides electricity for 157 towns in the States of Sao Paulo and Minas Gerais. Its present generating capacity is just over 100 MW and construction work on projects to increase this total by 45 MW is nearing completion. Much preparatory work has been done on the Peixoto project which will involve building a barrage 68 metres high and 85 metres wide on the Rio Grande river, from which water will be drawn to generate 400 MW. The station will be built in five stages, each of 80 MW installed capacity.

SWEDEN

Power Supply

The output of electric energy in Sweden during 1953 totalled 22,430 million kWh, an increase of 9·2% as compared with the previous year, according to the statistics of the Swedish Board of Trade. Net exports to neighbouring countries amounted to 298 million kWh, as against 130 million kWh in 1952. The country's water and steam turbines had an aggregate capacity of 6,965,000 h.p., equivalent to 5,985,000 kVA at the end of 1953. The corresponding figures for 1952 were 6,331,000 h.p. and 5,417,000 kVA. Within the total, hydro-electric output showed an increase of 9·3%, while the steam-generated power rose by 7%. Out of the 19,109 million kWh utilized in Sweden during the past year nearly half, or 8,277 millions was accounted for by the large and medium-sized industry. Electro-chemical and electro-thermal industries consumed 2,995 million kWh, railways and tramways 1,483 million, electric steam boilers 1,222 million, small industry, handicraft, etc., 1,262 million, and agriculture 740 million kWh. Public and private consumption totalled 2,946 million kWh over the twelve months.

S.W. ASIA

Madras Electrification

Rural electrification and irrigation are to be given special priority in Madras State under the second Five-Year Plan. This information was given recently by the Public Works Minister who also stated that he was now formulating a plan by which private electrical undertakings which were not likely to be nationalized for some time would be helped to participate in rural electrification schemes. Loan assistance from the Central Government would be given to such undertakings making proposals.

Projects for Sind

It is expected that the Provincial Government of Sind, Pakistan, will soon announce its decision regarding a number of schemes under consideration for providing electricity in many parts of Upper and Lower Sind. Two ambitious power schemes in Lower Sind are already under way. Under these a 15,000 kW thermal station is being erected on the bank of the Indus, near the Kotri barrage. (Orders for the plant have been placed from the U.K. special loan to Pakistan). There is a correlated grid scheme with 33 kV and 11 kV lines to adjoining areas. Meanwhile the Sind Government, in its effort to nationalise electricity supply in the province, have so far taken over eight undertakings. In most instances the

power supply has been increased. Small generating sets have been ordered for Dadu and Nawabshah.

Standards Building

The foundation stone of the new building of the Indian Standards Institution in New Delhi, was laid by Prime Minister Nehru a few days ago. The Institution was set up seven years ago, and has so far prepared and published nearly 500 standards; over 700 more are under preparation. The Institution will shortly issue its own certifying marks.

AUSTRALIA

W.A. Progress

From operations during the year ended 30 June last, the State Electricity Commission of Western Australia made a profit of £120,791, Mr F. C. Edmondson, the general manager, has reported to the State Parliament. During the year, Metropolitan mains had been extended by 136 miles, increasing the existing length of mains to 2,257 miles. At the end of June a total of 60,084 consumers were taking 50-cycle supplies, a further 21,637 having been converted from 40 cycles in the period. The new Albany diesel power station is now nearly ready to meet the load of several big industrial consumers to be connected. The survey of the first transmission line from Bunbury to Cannington has been completed and the clearing of the line is well advanced. Work has also started on the Wellington Dam hydro-electric station. During the year 888 miles of conductor were erected in the South-West scheme, 13,254 poles inspected and 724 old and unsafe poles were renewed. Boiler and building contractors started the erection of steelwork in July at the Bunbury power station site.

More Plant

The Hydro-Electric Commission of Tasmania has been given approval by the State Government to install an additional 200 kW generating set to supply the Currie town area. Cost of the set, together with necessary alterations at the station, would be about £24,000. The number of consumers at Currie has increased from 45 in 1952 to 215 at June 30, 1954, and other consumers are waiting to be connected. Present winter load on the station was 130 kW, the full capacity of the two existing generators.

Gravel in Turbines

One of the four water turbines at Tungatinah power station has had to be dismantled to clear it of gravel, the Tasmania Premier, Mr Cosgrove, has stated. He explained that the tunnel at Tungatinah was unlined, and it was expected that stones and gravel would be released for some time after the station had been placed in service. To collect this material, the Hydro-Electric Commission had incorporated a stone trap in the tunnel, but did not expect this trap to be filled before the coming summer, when system loading would have permitted it being cleared as a matter of ordinary maintenance. Recently, however, gravel began to be discharged through the turbines. The Commission took immediate steps to clear the trap, and no serious damage was done to the turbines, but one had to be dismantled.

NEW ZEALAND

Problem of Rural Areas

So long as electricity generation is a State monopoly, all people are entitled to power at a reasonable price, and there is a duty to see they receive the benefits under the Rural Reticulation Act, Mr C. J. Lovegrove, president of the New Zealand Electric Supply Authorities Association, told members of the North Auckland Power Board recently. He suggested that if any substantial relief were to be given country power boards the cost of distribution would have to be examined. The rural boards' major problem was not the cost of power from the State Hydro-Electric Department, but the cost of distribution. As deputy-chairman of the Auckland Electric-Power Board, Mr Lovegrove said the major city problem was the people's price consciousness. Electricity was the community's cheapest commodity, but boards should not be unduly influenced by the price-conscious attitude, providing boards followed prudent management of their trading concerns.

Loans for Power

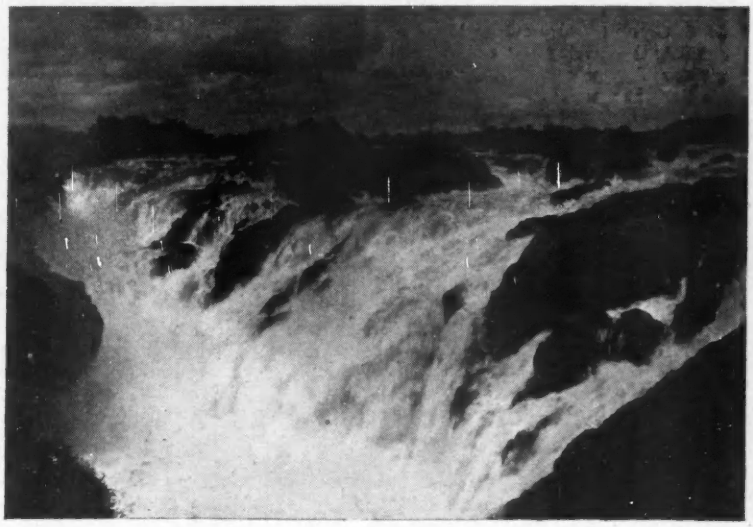
Consent to the raising of £40,000 of the North Canterbury Electric Power Board's loan of £80,000 for the extension and consolidation of electrical distribution network in its district has been given by the New Zealand Local Government Loans Board, according to the Gazette. The rate of interest is 4%. Consent has also been given to the raising of the balance of £20,000 of the Ashburton Electric Power Board's loan of £80,000 for further distribution work of its district.

JAPAN

Hydro Development

The Japanese government has approved the programme of river development for irrigation, flood control and hydro-electric power for the next 10 years. Estimated expenditure is Y 190,900 m. Power output is expected to be increased by 785,000 kW, and farm crops by 5,450,000 bushels. The areas selected are Kyushu, Tottori and Shimane Prefectures and the Tenryu river basin in central Japan. The project is expected to be financed internally.

The Venezuelan Government has recently appointed the firm of consulting engineers, Sir William Halcrow and Partners, to prepare a report on the Caroni River hydro-electric project. The River Caroni, with a minimum recorded flow of 314 cu metres/second and an annual flood of between 10,000 and 12,000 cu metres/second, is a tributary of the River Orinoco, and within a mile or so from the confluence are the impressive falls, a photograph of which appears below. The confluence with the Orinoco is accessible by ocean-going ships. The available head at these falls is about 45 metres. The Government propose to harness the water power in stages, the first providing about 150 MW, with the designs allowing for future development until the total potential is utilised, which might be as much as 1¼ million kW with full regulation of the river. Power will be partly for industry, and the production of steel and aluminium has been discussed. Iron ore is mined locally, and it is hoped that other heavy industries may be attracted. Preliminary construction will probably commence in the next dry season, i.e., early next year. Mr H. D. Morgan, M.SC., M.INST.C.E., a partner of the firm of Sir William Halcrow and Partners, returned last week from a visit to Venezuela. The President of the Comision del Electrificacion del Rio Caroni is Sr Mayor Rafael Alfonso Ravard, who recently visited this country and France.



Personalities

IN THE INDUSTRY

Manager of the Contracts and Estimating Department of Erskine, Heap and Co., Ltd., **Mr William Briggs** has now been appointed a director of that company. He served his apprenticeship and has spent all his working life, with the exception of a time spent on active service abroad during the first World War, since the age of 16 with that firm and has now completed forty-three years of service. He obtained his technical training at the Manchester College of Technology.

Divisional accountant to the South Western Division of the B.E.A., **Mr J. F. Prickett** has relinquished that post to join the British Oxygen Co., Ltd.

Appointed a director and chief engineer of the newly formed British Insulated Callender's (Submarine Cables) Ltd., is **Mr E. L. Davey,** B.SC.(ENG.), M.I.E.E. Also appointed a director and works manager of this new company is **Mr K. S. Brazier,** B.SC.(ENG.), M.I.E.E., M.I.MECH.E. Mr Davey received his technical education at the East London College and obtained a first class honours London University B.Sc., Engineering degree. Subsequently he served a college apprenticeship course with Metropolitan-Vickers Electrical Co., and became an assistant in the High Voltage Section of the Research Department. Later he joined W. T. Glover and Co., Ltd., as research and development engineer and in 1946 was appointed power cable engineer until 1950 when he became chief engineer of the company. In 1952 Mr Davey was seconded by the Glover Co. to be executive chief engineer to the Projects Engineering Panel of the B.I.C.C. Group to carry out on behalf of the B.E.A. the development and sea trial work for the proposed cross channel cable link. The present appointment follows the formation of the new Submarine Cable Co. Mr Davey has served on the main I.E.E. Supply Section Committee for several years, on the North Western I.E.E. Supply Section Committee both as a member and chairman. He was joint author of an I.E.E. paper on the gas filled cable for which he was awarded the Institution Premium in 1943. He has also published several technical papers and articles and has also served on many technical committees and has been responsible for a number of patents in the power cable field. Mr K. S. Brazier received his technical training at the City and Guilds (Eng.) College, London, and joined Callender's Cable and Construction Co., Ltd., in their outside Testing Department, later transferring to the Research Department. In 1940 he joined W. T. Glover and Co., Ltd., at Trafford Park, as assistant works manager, and in 1946 was appointed works manager.

Because of the increased management responsibilities resulting from a rapid expansion of business, the British Driver-Harris Co., Ltd., has just carried out a reorganisation at top-executive level, and the following appointments are announced: general manager (Cheadle works), **Mr Arthur Clark;** works manager, **Mr John H. Ireland;** assistant works manager, **Mr J. L. Cooper;** and foundry manager, **Mr H. McLeavy.** Thus the policy of the company, which is to reward meritorious service with promotion to senior executive positions, is given further practical expression, for all of the above have served the company for many years.

Previously chief assistant to the generation engineer (construction), Midlands Division of the B.E.A., **Mr L. C. L. Dale,** M.SC., A.M.I.E.E., has been promoted to generation engineer, construction, in that Division. Mr Dale graduated at Birmingham University, and after a period of twelve years in industry, spent mainly on development and design work, he joined the City of Birmingham Electric Supply Department in 1936 as technical assistant in the Construction Department. Subsequently, he was promoted to engineer in charge of drawing office in 1938, chief technical assistant in 1944, and chief assistant to constructional engineer in 1945. Since 1936 he has been concerned with the construction of Hams Hall "A" and "B," Nechells "B," and Drakelow "A" and "B."

The General Electric Co., Ltd., announces the appointment of **Mr J. S. Langlands** as assistant manager for Scotland. Mr Langlands, whose early training was received in Clydeside engineering shops, joined the G.E.C. in 1933. During the war he held a number of appointments in R.E.M.E., including that of senior technical liaison officer between the War Office and U.S. Forces in Europe. Later he became Commandant, Rawalpindi Area, India, with the rank of Colonel. In 1948 he was appointed managing director of the British General Electric Co. (Canadian) Ltd. Mr Langlands was vice-president of the Canadian Association of British Manufacturers and Agencies.

The appointment of **Mr B. C. Fleming-Williams,** B.SC., as general manager of Sylvania-Thorn Colour Laboratories Ltd. is announced. After some years of research on vacuum engineering at London University Mr Fleming-Williams joined the "special" lamp works of Edison Swan in 1931 and was concerned with putting high pressure mercury vapour lamps on the market. In 1935 he joined A. C. Cossor Ltd. and was responsible for the double beam cathode ray tube which he patented, returning to London University in 1938 to undertake some research on plastics for the Electrical Research Association. In 1940 he re-joined Cossor's to work on beam deflection valves and airborne radar equipment and later was in charge of the

Mr W. Briggs

Mr K. S. Brazier

Mr E. L. Davey

Mr J. S. Langlands

Mr Fleming-Williams

first marine radar equipment. As Director of Research with that firm he was responsible among other things for the large airfield control radar system now in operation at London Airport. Sylvania-Thorn Colour Laboratories is a new company jointly owned by Sylvania Electric Products Inc. of U.S.A. and Thorn Electrical Industries Ltd. The new company is engaged on research and development work on colour television, including the design of cathode-ray tubes and upon problems arising from the application of semi-conductors to the Electronics Industry. Mr Fleming-Williams commences his new duties with Sylvania-Thorn next Monday.

Mr A. W. Welton, A.S.A.A., has been appointed to the board of Mullard Ltd. He has been continuously associated with the Mullard group of companies since he joined the Mullard Radio Valve Co. Ltd. in 1923. He is already a director of Mullard Overseas Ltd. and Mullard Wireless (Near East) Ltd. A Freeman of the City of London, Mr Welton is also chairman of the Radio and Electrical Trades' Guardian Association and a member of the Institute of Credit Management.

After 41 years' service with the British Thomson-Houston Co., Ltd., **Mr R. S. Jones,** M.I.E.E., manager, Plant Sales Department, has retired. He is succeeded in that position by **Mr R. M. Grant,** B.SC., M.I.E.E. Following upon technical courses at Gordon College, Aberdeen, and Royal Technical College, Glasgow, Mr R. S. Jones spent his first two years with BTH in the Testing Dept., gaining considerable experience as tester-in-charge of the heavy machine sections. Mr Jones then spent a period in the Special Engineering Department before joining A.C. Engineering Department in 1916, to concentrate on the design of both induction and synchronous motors of large sizes. In 1919, he joined the commercial engineering staff to specialise in heavy plant drives, notably for rolling mills, and was appointed Manager—Plant Sales in 1936. His successor, Mr R. S. Grant, also a Scotsman, graduated at Glasgow University, and served a three-year graduate apprenticeship with BTH on the completion of which in 1932, he joined the company's construction staff (London district). In 1936 he returned to Rugby to take up a commercial engineering appointment in Plant Sales Department, with particular responsibility for rectifier contracts. Since 1946 Mr Grant has been closely identified with contracts for hydro-electric equipment, and in 1952 was appointed assistant manager of the department of which he now becomes manager. He has visited many countries abroad on behalf of BTH, and has contributed technical articles to home and overseas journals, apart from the presentation of technical papers to professional institutions.

Mr W. F. Cusworth

Mr T. E. Loraine

Mr C. R. Garnett

Three appointments of power station superintendents are announced by the North Eastern Division of the B.E.A. For the new Stella South power station, **Mr W. F. Cusworth,** B.SC., A.M.I.E.E., has been appointed station superintendent. Since January last he has held a similar appointment at the Division's Dunston "A" and "B" and Blaydon power stations. Mr Cusworth joined the North Eastern Electric Supply Co. as an assistant engineer following his demobilisation from the Navy in which he served during the last war as a lieutenant. From 1951 to 1954 he was deputy station superintendent at Dunston. His successor as station superintendent at Dunston "A" and "B" and Blaydon power stations is **Mr T. E. Loraine,** A.M.I.E.E., who has been deputy station superintendent at Dunston since Feb. last. Educated at Darlington Technical College, Mr Loraine served an apprenticeship with the Darlington Forge Co. He had experience with various industrial firms, including A. Reyrolle and Co., before entering the Electricity Supply Industry in 1935. Prior to vesting day he held appointments at Darlington, Preston, and York power stations and transferred to Carville in 1949. He was station superintendent at Carville from 1951 until Feb. last. The third appointment is that of **Mr C. R. Garnett,** B.SC.(ENG.), A.M.I. MECH.E., A.M.I.E.E., as superintendent at Stella North power station. Mr Garnett received early education and training at Lincoln Technical College and University College, Nottingham. After service in the R.N.V.R. during the war, he joined the North Eastern Electric Supply Co. in 1946 and served at Carville and Dunston "A" power stations before joining the Divisional h.q. staff. Following a period at Dunston "B" power station, he was appointed senior assistant engineer to the chief generation engineer (operation) and in this capacity has been closely connected with the design of the Stella power stations.

Works director of George Kent Ltd, **Mr W. A. Hartop,** leaves England today, 9 Sept, for a two-months stay with the firm's Canadian subsidiary, Kent-Norlantic Ltd in Toronto. The main object of his visit is to assist the production organisation of Kent-Norlantic towards full operation and also to investigate further valuable export prospects with George Kent products.

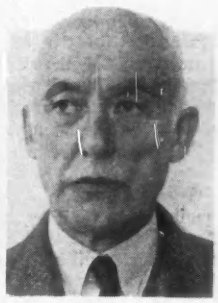
We are now able to reproduce below the photograph of **Mr S. M. Hill,** M.I.MECH.E., F.INST.F., who, as we noted last week, is relinquishing at the end of October his appointment as generation engineer (operation) with the South Western Division of the B.E.A. As we stated, he is to continue for a time in a consultative capacity on operational matters associated with the construction of Portishead "B" power station.

Mr A. W. Welton

Mr R. S. Jones

Mr R. M. Grant

Mr W. A. Hartop



Mr S. M. Hill

Sir Ernest Guest, K.B.E., C.M.G., C.V.O., a director of the English Electric Co. of South Africa (Ptg.) Ltd, and of the Marconi Co. of South Africa, has just completed a tour of industrial centres in England and Scotland in the course of which he visited the English Electric Works, prior to returning to South Africa.

Group Captain R. C. Richmond has been appointed to the London office of Marconi's Wireless Telegraph Co. Ltd. for his duties in connection with that company's aeronautical radio business. Educated at Westminster School and the City and Guilds (Engineering) College, Group Capt. Richmond joined the R.A.F. in 1929, and took the specialist signals course. Among appointments he held during the war were chief signals officer West Africa, chief signals officer Coastal Command, and chief signals officer Air Defence of Great Britain. Prior to retiring, Group Captain Richmond was Commanding Officer of No. 2 Radio School, Yatesbury.

Gp Capt R. C. Richmond

At the meeting of the Council of the British Association for the advancement of Science last week, **Sir Robert Robinson,** O.M., F.R.S., Waynflete Professor of Chemistry, Oxford University, was elected president of the Association for the ensuing year in succession to **Dr E. D. Adrian.** At last week's meeting the honorary degree of Doctor of Science was conferred on **Sir Ben Lockspeiser, Sir John Lennard-Jones** and **Sir Harold Spencer Jones.**

Manager of the London branch office of the Danfoss Manufacturing Co., **Mr E. Bruhn,** has now relinquished his position with that firm, we are informed.

Mr L. A. Jackson, F.C.I.S., previously an assistant secretary (administration) with the Eastern Electricity Board, has been promoted to deputy secretary to the Board. Following this appointment, Mr Jackson has found it necessary to resign as secretary of the Eastern Electricity Consultative Council. **Mr F. W. Clarke,** an assistant secretary (administration) with the Board, has now been appointed to that post.

Mr J. E. Earle has relinquished his appointment with Tenaplas Ltd., and has joined Hellerman Ltd. as sales representative. He will handle all the sales of plastic extrusions made by its associate company, Cheltenham Plastics Ltd. A new department has been set up under the heading, "Plastic Extrusion Division," which will be in the charge of **Mr C. E. D. Catley.** Mr Catley remains as general manager of Cheltenham Plastics Ltd.

Mr Donald McDonald, B.SC., F.R.I.C., M.I.CHEM.E., F.I.I.A., F.I.M., chairman of the Executive Committee of the board of Johnson, Matthey and Co., Ltd., since 1950, has retired after 44 years' service with the company. At a brief ceremony in the recently completed Hatton Garden office block Mr McDonald was presented with a cheque and a bound book of signatures of his colleagues and friends throughout the company.

Mr G. V. Vaughan, ASSOC.I.E.E., has been appointed district engineer for the Haverfordwest district of the South Wales Electricity Board in succession to **Mr A. Jolley,** who has gone to the Tenby district of the Board. Mr Vaughan was previously first assistant at Haverfordwest. His earlier experience was gained with the Shropshire, Worcestershire and Staffordshire Electric Power Co., and with the Kirkudbright County Council's electricity undertaking.

Mr H. J. Finden, M.I.E.E., chief engineer of the Electronic Instruments Laboratory of the Plessey Co., Ltd., is now in the U.S.A. attending the official opening of the new laboratory of the United States Bureau of Standards, at Boulder, Colorado. He will be in the United States for several weeks making a general study of computing problems and electronic controls.

OBITUARY

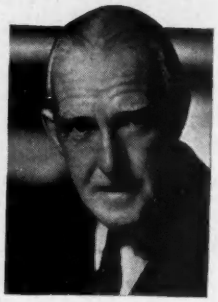
Mr John M. Young, managing director of Unity Heating Ltd., died on 2 Sept., aged 56.

Mr R. F. Jones, late chairman and managing director of Clyde Fuel Systems Ltd., died on 4 Sept.

Mr Maurice Solomon, who, until his retirement in 1951 was a director of the General Electric Co., Ltd., and its associated company, Pirelli-General Cable Works Ltd., died on 1 Sept. He joined the Robertson Lamp Works at Hammersmith in 1903 as assistant to Mr Robertson and subsequently was put in charge of filament making. In 1904 he was transferred to Witton as manager of the carbon works. In 1915 he was elected to the board of directors of the G.E.C. and in 1920 to the board of the Pirelli-General Cable Works Ltd. Both in 1929 and 1936 he was chairman of the Cable Makers Association and, in 1932, vice-president of the International Cable Development Corporation, becoming president in 1948 (an appointment which he held until his death).

Mr C. Turnbull, M.I.E.E., formerly borough electrical engineer at Tynemouth, died on 30 Aug., aged 84. He held that position from 1899 until retiring in June 1935. He was educated at Fettes College, Edinburgh, and Armstrong College, Newcastle-on-Tyne. He served an apprenticeship with C. A. Parsons and Co., and after other electrical experience became chief at Tynemouth.

It is with deep regret that we record the death, on 31 Aug., of **Sir John M. Kennedy,** O.B.E., B.A.(ENG.)., M.INST.C.E., HON.M.I.E.E., aged 74. To many in the Electricity Supply Industry, he will be remembered for the major part he played in shaping the industry into its present well-knit system. Receiving technical education at Zurich Polytechnic and Cambridge University, taking the Engineering Tripos at Cambridge in 1900, he gained practical experience with firms in England and Germany before joining the staff of Kennedy and Jenkin in 1902. He was a partner in that firm with Mr Donkin from 1908, the title being changed to Kennedy and Donkin in 1913 on the retirement of Mr Jenkin. Sir John was connected with many important works, including the first electrification of the L.C.C. Tramways; the electrification of the Hammersmith and City Railway (for the G.W.R.); of the Western and Eastern sections of the Southern Railway, and of the first section of the L. and N.W. Railway. In 1922 he submitted to the Electricity Commissioners proposals for the reorganisation of electricity supply, and, after the passing of the 1926 Act, prepared for the Electricity Commissioners the technical and financia data upon which were based the regional schemes. He was a member of the Fuel Research Board for a period of four years from 1930, and in 1934 took office as Electricity Commissioner, serving as chief technical member of the Commission, devoting special attention to electricity distribution. He was deputy chairman of the Commission from 1938 to 1947 when he became chairman for the final period. Afterwards, Sir John acted as London member of the Uganda Electricity Board until 1952. He was president of the I.E.E. in 1935, of the A.S.E.E. in 1933, and of the Electric Vehicle Association on several occasions. A man of charming manner, Sir John will be greatly missed by a wide circle of friends. A memorial service to Sir John Kennedy is being held at the Queen's Chapel of the Savoy, Savoy Street, W.C.2, on 16 Sept., at 12.15 p.m.



Sir John Kennedy

Mr T. Horsfall, electrical supervisor with W. H. Gatley Ltd., of Todmorden, died on 3 Sept.

Mr W. M. Ritchie, chairman and managing director of the Wallacetown Engineering Co., Ltd., died on 2 Sept.

More Hydro-power for Scotland

Luichart and Ullapool power stations now opened

TWO further steps in the development of hydro-power in the Highlands were taken last week when, on Friday, the Hon. Mrs Ian M. Campbell started the generators at Loch Luichart Power Station, and on Saturday a similar ceremony was performed by Sir John Cameron at Ullapool.

The Luichart station forms part of River Conon scheme which will ultimately involve some six generating stations with a total installed capacity of 107 MW and an estimated output of 442m units per year. First of the stations in this scheme to go into operation is Grudie Bridge, which utilises the waters of Loch Fannich. With an installed capacity of some 24 MW this station has now been running since 1950. The second stage involves the Glascarnoch-Luichart-Torr Achilty scheme. The Luichart station itself, with an installed capacity of 24 MW in two 12 MW sets operates with a gross head of 185 ft and uses the artificially-raised waters of Loch Luichart as its storage reservoir. On the general scheme about 1,400 men are at present employed on the driving of tunnels, the building of dams, power stations, roads, a length of railway track and a railway station. Three other power stations are involved in this section of the main development, Achanalt with one 2 MW set, Glascarnoch with two 12 MW units and Torr Achilty, with two 7·5 MW sets.

The third stage of the Conan development is the Orrin scheme in which a new loch will be formed by a dam in Glen Orrin, and from this water will be taken by tunnel to a power house in Strathconon near Achonokie.

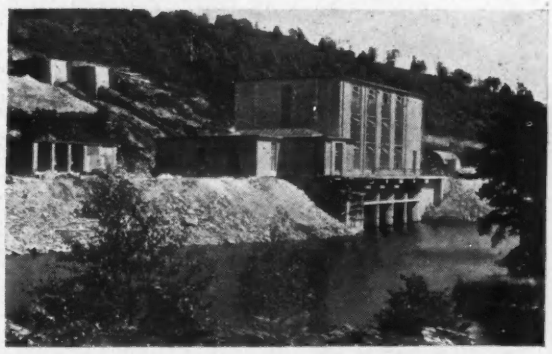
Ullapool

The Ullapool scheme is comparatively small, having a total capacity of 900 kW derived from two 450 kW turbo-alternators operating under a gross head of 543 ft. The civil work involved the construction of two main dams, raising the crest level of an existing weir at Loch na Maoile and laying 3,475 ft of 27 in. diameter steel pipeline. The station will be connected to the 33 kV overhead transmission line installed between Ullapool and Lochinver, and interconnected with the Board's main system. Speaking at the opening of Ullapool, Mr Thomas Johnstone said that in the area, water power was now supplanting diesel oil so that slightly cheaper rates for electricity were now available. Already 98% of the total premises in Ullapool—282 consumers—had a supply. With the extensions authorised, all the main townships on the north-western seaboard would shortly be supplied.

Owing to the sparse population in the areas concerned, consumers read their own meters, returning the information on a postcard, and thus contributed toward keeping down cost. As far as the Board's work was concerned, the speed at which the Ullapool contract had been completed had set up a new record of under two years.

Mr Thomas Johnston had also some words to say at the opening ceremony at Loch Luichart, where the main topic of his speech concerned the preservation—and indeed improvement—of fishing facilities. The Board were providing fish passes and salmon hatcheries, stocking lochs and rivers with trout and salmon, and cleaning out pike and other predatory fish.

In the Conan Valley, an area designated for future industrial development in the Highlands, it was not only possible to supply the necessary power now, but in addition a surplus was available for railway electrification.



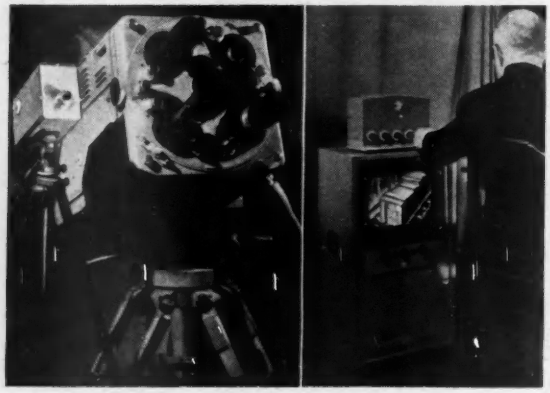
The sylvan setting of Luichart power station contrasts vividly with the rugged scene of the Ullapool Dam

Equipment for Industry

TV in the Factory

THE use of closed-circuit television systems in industry has long been considered a possibility. By this means production flow methods, and any dangerous operations such as testing specimens to destruction or viewing chemical experiments could be studied in detail remote from the actual location. In the medical field, of course, the use of such systems for viewing operations is well founded. The main objection to their use in industry, however, has been cost, and it is on this score, that the new television system, incorporating the "Pocket" camera illustrated below, being produced by MARCONI'S WIRELESS TELEGRAPH CO., LTD., will prove acceptable, since the price is in the region of £500 for the complete equipment. This comprises a miniature camera, control unit and monitor.

Weighing only 4½ lb the new camera compares favourably with the 140 lb which a standard TV camera weighs and to ensure complete reliability the unit contains only the minimum number of components, a tube, three valves and associated circuitry. A coaxial cable carries the signal to the control unit, which contains the main equipment and a power source from which all components are supplied. This unit, of small dimensions, and weight, is simple to operate and controls the monitor screen or screens which may be placed any distance up to 2,000 ft from the picture source. The makers emphasise that this instrument is in no way intended to replace the standard television broadcast camera. Developed for industrial and commercial purposes, it should prove of immense value in those fields.



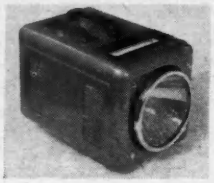
Left, the 'Pocket' camera is shown alongside studio camera, and right, the monitor and control unit are seen

Stroboscopes for Machine Testing

STROBOSCOPES find their way into industry in a variety of ways and in the two new equipments which ELECTRIC AND MUSICAL INDUSTRIES LTD., Hayes, Middx., are now manufacturing, they form the basis for the operation of the respective machines. The first, a dynamic balancing machine specially designed for use by the electric motor, aircraft and motor car industries, is made in two sizes. Both operate on speeds ranging from 1,000—2,500 r.p.m., but whereas type 1 can handle rotors weighing up to 30 lb measuring 11 in. diameter and 14 in. between centres, for type 2 those figures are reduced to 7 lb, 4 in. and 8½ in. respectively. The equipment is simple and positive in use. The rotor to be balanced is supported in the open bearings of two freely-suspended cradles and belt driven by an electric motor. By means of special circuits, incorporating transducers, the unbalance produces an electrical signal which is arranged to flash a stroboscopic lamp which illuminates the workpiece under test. It thus appears stationary, with the position of the unbalance indicated against a pointer; at the same time, the signal actuates a meter to indicate the amount of unbalance.

The instrument is shown here with rotor in position for balancing

The second instrument is a new high-power industrial type stroboscope which may be used for measurement of speed, the observation of rotary or reciprocating motions and for special applications in the electro-medical world.

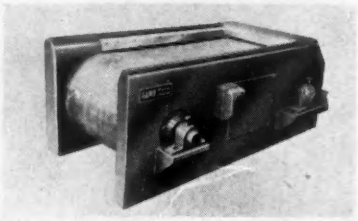


Known as the Type 3B this instrument is easily portable, and weighs 31 lb

The instrument is arranged to arrest motion of machinery so that it can be examined under a white light of high intensity. This is obtained from a gas-discharge lamp with its grid triggered by an electrical impulse obtained either by closing a mechanical contact or from a 5 V sine-wave input or a 1 V positive pulse. Readings are taken from a precision grade moving coil meter, accuracy 1% of full-scale deflection, this is calibrated in r.p.m. and flashes per second, with maxima at 6,000 and 100 respectively. By reading a set number of repetition images and multiplying the scale reading appropriately, speeds of up to 48,000 r.p.m. may be measured.

Magnetic Tramp-Iron Diverter

THE use of magnetic separators for separating tramp-iron from non-ferrous materials has long been well established and equipments have been manufactured in two main types, the pulley and drum. Where burdens prove too great or the concentration of iron is too intense, advantage may be taken of a new extra-high intensity tramp-iron diverter unit, known as the "Rapid 4 T," manufactured by RAPID MAGNETIC MACHINES LTD., Lombard St, Birmingham 12.



High efficiency is claimed for the "Rapid 4T" magnetic separator

Claimed to have a field strength four times that of the conventional types of equivalent size, the increased efficiency is said to have been achieved by eliminating leakage flux as far as possible, thus concentrating the flux in the operational centre. Total enclosure of the stationary energising coils, the absence of slip-rings, incorporation of dust-proof ball bearings, coupled with a minimum of moving parts, ensure a long life with negligible maintenance. Features of this unit are the smooth unhindered discharge and that it may be used in a self-contained separator or as a magnetic drum or pulley.

The "Santoware" Baby Feed Heater

BOON to nursing mothers and fathers is the "Santoware" baby's bottle heater by the SANTOS MANUFACTURING CO., LTD., 5 Chalk Farm Rd, N.W.1. It enables a mother to prepare her child's feed during the night with the least inconvenience. The heater is thermostatically controlled and has an indicator lamp showing when the feed is ready. Attractively finished in assorted colours the heater is for 100/110 V or 220/250 V a.c./d.c. supplies and costs 27s. 6d.

A boon to mothers is this new bottle heater

Paladin Developments

A NEW showroom for Paladin mixers has been opened in London (see page 379) where trade customers are welcomed.

Made in Southampton by L. P. Patents Ltd., these mixers are being distributed by BARCLAY AND SONS LTD., 34/6 Beech St, E.C.1. They are available in three models (see ELECTRICAL TIMES 3 Sept, 1953), the Junior at £15. 19s. 6d. (inc. P. tax), the Senior £20. 11s. 9d. (inc. tax) and the Twin at £32. 4s. 2d.

The Junior is now a single speed model with speed booster button and is nearly £2 cheaper whilst prices of the other models are slightly reduced. Accessories available include a dough hook, cleaning spatula, and mixing bowl attachment for the Senior, whilst development work on a juice extractor for both "Senior" and "Twin," mincer, potato peeling and bread and bacon slicing attachments is in progress.

We understand that a scheme of simple hire to hospitals and institutions is planned.

Engels New Heating Pad

DUE for introduction this month by S. I. ENGEL, 23/25 Kensington Park Rd, W.11, is their new "l'Exquisite" heating pad with three-heat variable thermostat. Size is 12 in. by 16 in. These pads, which will be supplied for voltage ranges 200/220 V, 230/250 V will be packed in attractive cartons. The price of 27s. 6d. plus purchase tax includes guarantee.

A Mazda Flash Bulb

A NEW economical flash bulb, the Mazda No. 3, which is specially suitable for use with simple cameras is announced by BRITISH THOMSON HOUSTON CO., LTD, Crown Hse, Aldwych, W.C.2. This new flash bulb is expected to create an entirely new demand by amateur photographers who have hitherto not used flash. The No. 3 bulb has the same colour temperature and peak lumens as the well-known Mazda No. 5 bulb but peaks in 12 m.sec. instead of 21 m.sec. Price 10d. (No Purchase Tax).

Mazda No. 3 bulb

G.L.S. Lamps in Smaller Bulbs

LAST year readers will remember Osram 40 W and 60 W G.L.S. lamps were marketed in the same bulb size. A further stage has now arrived with the introduction of 75 W and 100 W single coil and coiled coil lamps in 68 mm. dia. bulbs for all three types (clear, pearl and silverlight).

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, point out that the reduction in bulb diameter for the 100 W lamp makes it possible to adopt smaller cartons for this rating thus saving space on distributors' shelves.

TRADE PUBLICATIONS

COMPONENTS.—New Catalogue No. 193 issued mid-1954 by A. F. Bulgin and Co., Ltd., Bye Pass Rd, Barking, Essex, lists for the first time many new components added to the firm's range.

INSULATION.—Protective and Insulating tapes made by the company are described in Publication No. 339A issued by British Insulated Callender's Cables Ltd., 21 Bloomsbury St, W.C.1.

DIESEL TRACTION.—Davey Paxman and Co., Ltd., Colchester, Essex, have published a brochure showing the range of diesel engines for rail traction and the locomotives in which they are built.

TELEPHONES.—Strowger private automatic telephone exchanges are featured in new publication 836/3/cs issued by Communication Systems Ltd., Strowger House, Arundel St, W.C.2.

INFRA-RED HEATING.—A revised edition of their booklet on infra-red heating for livestock has been published by Philips Electrical Ltd. It contains up-to-date information on poultry breeding, pig farrowing and the rearing of calves and foals.

ACCESSORIES.—B.G. insulated electrical accessories are featured in the latest catalogue issued by the British General Manufacturing Co. (1941) Ltd., 38 Glasshill St, S.E.1.

MULTI-PURPOSE ELECTRIC TOOLS.—A leaflet describing the "Diprofil" machine which features cutting tools for toolroom and precision engineering work is available from Brooks and Walker Ltd., 47 Great Eastern St, E.C.2.

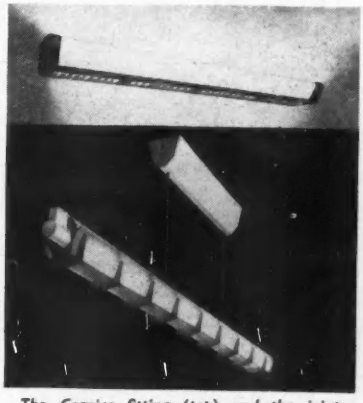
TELECOMMUNICATIONS.—Telegraph distortion measuring sets TDMS 5 and TDMS 6 are described in detail in Publication R.E.B 105 issued by Automatic Telephone and Electric Co., Ltd., Strowger House, Arundel St, W.C.2.

For the Electrical Trade

New Ekco Lighting

TWO recent additions to the range of lighting fittings supplied by EKCO-ENSIGN ELECTRIC LTD., 45 Essex St, W.C.2, are the models illustrated below. The first is the "Cornice" lighting fitting constructed of reeded "Perspex" panels and metal louvres both of which can be supplied in a variety of bright colours to blend with existing colour schemes. Ideal for restaurants, cinemas, etc., this fitting gives mainly upward light but there is an attractive diffusion of light downward through the louvres.

The pendant fitting shown was specially designed by the Building Research Station and developed and manufactured by Ekco-Ensign. Light in weight and modern, it has a spine constructed of transverse metal louvres coupled with diffusing opal "Perspex" side screens. Made to accommodate a 5 ft 80 W lamp the fitting can be stove enamelled any colour and is suitable in particular for school lighting.



The Cornice fitting (top) and the joint BRS/Ekco Ensign fitting

PROBLEMS AND PRACTICE

In Engineering

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

Makeshift Repairs

A FEW years ago, as electrical engineer of a ship homeward bound in the Indian Ocean, I found an earth on the electrical machinery in the engine room. When traced this proved to be on the armature of a 5 h.p. bilge pump motor.

After taking the armature out and finding no visible signs of the fault, I unsweated the commutator connections and lifted the top ends, and testing found top and bottom coils in one slot earthed and shorted together.

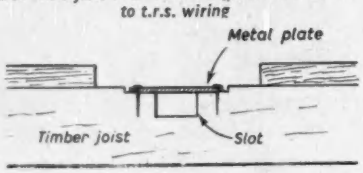
Although very short of materials I decided to try to effect a repair, and cutting off the bands lifted out the two faulty coils, each of which being made up of three turns of flat strip, linen taped. After stripping and cleaning the coils I re-taped, shellaced and then baked them in the galley oven. However, when refitting the coils, I found I had neither "Leatheroid" nor "Presspahn" sufficiently light enough for relining the slot. After some thought I secured a piece of ordinary light, brown wrapping paper and cutting off three strips shellaced them and stuck them together while still tacky. Lining the slot with this I replaced the coils and testing after each operation soldered and banded the armature.

This motor ran three hours a day for five weeks until the ship arrived in a U.K. port when the armature was sent off for re-insulating.—*J. C. J.*

Converting to T.R.S.

HOUSING installations that originally consisted of either c.j. tube and v.r.i. cables or capping and casing, now being replaced with t.r.s. types, present a problem where the t.r.s. cables use the original runs. When the conduit or capping and casing have been removed, a line of slotted joist is left. The t.r.s. cables can then either be laid directly into the slots, or through holes augered underneath the slots. Whilst the latter is of course preferable, as the cables are well down out of the way of errant floor nails, the disadvantage of this method is that it often weakens the joist, particularly when a slot about an inch deep in the top of the joist is supplemented with a 1 in. hole, augered diagonally underneath it.

This sketch indicates the method of covering a slot in the joist when converting old installations to t.r.s. wiring



When the job is under the direction of an architect, this practice is invariably frowned upon, and when one recalls the amount of trouble caused in the White House in America by the amount of holes cut into timber joists, they no doubt have good cause. Laying the cables directly into the slots, on the other hand, requires compliance with I.E.E. Regulation, 404 H, which not only entails screwing down the floorboards, a lengthy and tiresome business, but also leaves an unsightly line of screwheads.

A method the writer uses to overcome this problem is to cut a shallow slot either side of the original slot and nail a metal plate over the slot. (Odd bed laths cut up are ideal for this purpose). This makes a neater job and prevents the cables jumping out of the slots while the floorboards are being laid and as it provides protection against floor nails it presumably satisfies Regulation 404 H.

An alternative to this method, is to choose an alternative run, say 18 in. to one side of the slots, but the objection to this is of course that it entails removing more floorboards and usually requires another yard of cable on each circuit, coupled with the fact that the original cable run was probably more suitable.—*W. Satchwill.*

Pitting in Bearings

THE bearing troubles usually encountered on motors and generators fitted with ball or roller bearings are generally due to some abnormal condition to which the bearings have been subjected and rarely due to any inherently defective bearing. In the light of experience it is generally possible to quickly diagnose the troubles which arise from the more common faults such as "stationary vibration" damaging roller bearings or excessive end-thrust causing damage to ball bearings.

In order to diagnose the more elusive ills and prescribe a cure the symptoms involved should be quickly recognised. A more uncommon failure of a bearing, in the industrial field, is that which occurs due to the passage of a current through a bearing resulting in a spark passing through the very thin film of oil between the ball or rollers and the race.

The effects of the spark is always first evidenced by pitting, the typical small craters formed having burnt or dark edges. The pitting is of course cumulative depending upon the duration of the sparking set-up by the current. At a later stage axial ridges may be formed but in the early stages the trouble may be recognised by the race showing small pits or craters with burnt edges showing discoloration which ranges from brown to black.—"*Torque.*"

Testing Relays

REFERRING to Mr Robbins' note under the above heading (3 Aug. issue), in which he states that an additional battery operated relay is necessary for testing the opening time of o.c.b.'s with modern time interval meters, this is not required as the clock can be stopped by either a closing or an opening contact. In the former case, as shown in the

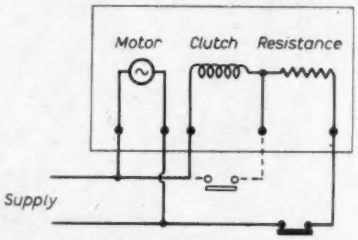


Diagram of modern time interval meters showing how they can be adapted for either closing or opening o.c.b. contacts

diagram, the closing contacts are connected across the clutch coil so that on closing the circuit, the coil is short-circuited leaving only the resistance in circuit. In the latter case the contacts are in series with the clutch and resistance coils so that on opening, the clutch is de-energised. It is always preferable to use the main contacts of an o.c.b. for time tests as an auxiliary may open or close before or after the main contacts.—*B. E. J.*

HAVING had the opportunity to read B. E. J.'s comments beforehand, I can only reply by agreeing that the clock may be stopped as he describes, without using an additional relay. From past experiences, I have come to the conclusion, however, that on the score of safety the use of an additional relay may be preferable, although I failed to mention this in my previous note. I have known several cases where personnel have received unpleasant electric shocks when, for various reasons, coming into contact with the o.c.b. terminals to which the time interval clock had been connected in series, as described above.—*E. A. Robbins.*

NEWS OF THE WEEK

New Plans for N. Wales H.E. Schemes

Parliamentary Bill to be promoted for Ffestiniog and Rheidol Projects

THE B.E.A. is to promote a Bill for the development of the Ffestiniog pumped storage and Rheidol hydro-electric schemes in North Wales during the next Parliamentary session. Permission of the Minister of Fuel and Power to do this is now being sought. Proposals were originally put forward three years ago for hydro-electric development in the areas concerned, but they had to be shelved because of restrictions on capital development. The projects have since been reinvestigated and revised schemes prepared, and these should provide a great improvement as regards their effect on local amenities. Similar safeguards are being taken now to preserve amenities as was taken in the N. Wales Hydro-Electric Power Act, 1952, and due attention will be paid to riparian interests by providing for the discharge of reasonable quantities of water below each of the points of extraction. Opposition was originally voiced because it was proposed to divert the head waters of the Severn and Wye into the Rheidol catchment and those of the Rheidol into the Dovey estuary, but these plans have now been excluded.

The mining district of Blaenau Ffestiniog is the site of the pumped storage scheme, believed to be the first of such a size to be built in this country. It is proposed to use the existing Llyn Stwlan as an upper reservoir, increasing the storage capacity by erecting a concrete dam 90 ft high and some 900 ft across. The lower reservoir will be formed by a second dam 35 ft high and 1,800 ft long near the village of Tany-y-Grisiau. Between the two reservoirs there will be a head of approximately 1,000 ft. The power station is to be located at the lower reservoir and will contain six combined generating and pumping sets each comprising a water turbine, centrifugal pump and generator-motor. The expected annual output of 300 million units will be fed into part of the 275 kV supergrid.

The Rheidol scheme is situated about 10 miles from Aberystwyth, and the available head of water will be employed in two main stages providing a total generating capacity of 49 MW. In the upper stage, a dam will be built across the Afon Rheidol at Nant-y-Moch to form a reservoir which will be connected by a tunnel and surface pipe line to a power station two miles down-stream and discharging into the same river. The lower stage will comprise a small balancing reservoir formed by a dam across the Rheidol just below the power station and connected to a second station discharging into the river just below Rheidol falls. To avoid disturbance by intermittent discharges a regulating pond will be built. This will create a head and the opportunity will be taken to generate a further 1,000 kW. Annual output is anticipated at 83 million units. Part will be fed into the national grid through a new 132 kV transmission line to Oswestry, and the rest will be used to supply local loads. Presuming these schemes are authorised some 349,000 kW of additional generating capacity will be provided.

ANOTHER CANADIAN EXHIBITION RECOMMENDED

ANOTHER recommendation to British manufacturers to participate in overseas exhibitions concerns the fiftieth annual Hardware and Household Exhibition which is to take place in Toronto early next year. This follows information given last week on Montreal's All-Electric Show and Trinidad Trade Fair. The Toronto Show is to be held in the Automotive Building between 7 and 10 Feb. It is mostly for the trade but the general public are admitted on the first evening. Space allocations have already begun and some time ago about 200 of the 465 booths on the main floor had been booked. These are 10 ft wide by 12 ft deep and sold in any multiple of 10 ft up to a maximum of ten booths. Cost of a booth is $175. The same arrangement is in force on the mazzanine floor but the booths have slightly different dimensions.

Organisers of this exhibition are the Canadian Retail Hardwares Association, and further details may be obtained from them at 290 Merton St, Toronto 7.

U.K. Firm in Venezuela

THE Brush Group has been paying increased attention to the potentialities offered by the S. American market in the past few months, and notably to Venezuela. In consequence it is not surprising that the company have formed a separate concern which will trade under the name Brush Group de Venezuela Sociadade Anonima. Mr C. P. Court, formerly with the Group's Agents, Compania Anonima Motoria, has been appointed director and manager.

Metrovick Maintains their Brazilian Railway Stock

First building of Metrovick do Brasil (Electricidade) Limitada's new factory at Belo Horizonte, was officially opened last month by Dr Juscelino Kibitschek. The company is a subsidiary of Britain's Metropolitan Vickers Electrical Co. Ltd., who have supplied a large amount of electric rolling stock for the Brazilian railways, and the main purpose of the new factory is to carry out heavy maintenance work. Twenty-four new electric Metrovick locomotives recently went into service and it will be recalled that a large contract involving the supply of a large quantity of stock was signed early this year to augment an already appreciable amount in operation. Our photograph shows the entrance of the new traction repair factory.

OFFICIAL PUBLICATIONS

BRITISH STANDARD.
B.S. 96, 1954: Carbon Brushes (parallel-sided) for use on Commutator and Slip-ring Machines.

INDUSTRIAL ENGINEERING. Report of Anglo-American Council on Productivity. (see this page). British Productivity Council, 21 Tothill St, S.W.1, 5s.

ELECTRICAL SAFETY IN HOSPITALS—USE OF ANTI-STATIC RUBBER. Memo no. H.M. (54) 79. Issued by Ministry of Health.

APPLIED RESEARCH IN TECHNICAL COLLEGES, 18. Published by London Regional Advisory Council for Higher Technological Education, Tavistock Hse South, Tavistock Sq, W.C.1. 2s. 6d.

Time-Switch Cookery at Food Fair

CONSPICUOUSLY featured on the E.D.A. stands at the Food Fair, being held at Olympia from Sept. 7-18, is "Time-Switch Cookery." This uses time-switched cookers which can be arranged to switch on at a pre-set time, and after a further pre-set interval of time will automatically switch themselves off.

At the E.D.A. Stands (33 and 19) demonstrations of "absent control" in cooking can be seen, both as a "live" exhibition and in a film presentation, by Marguerite Patten, the T.V. star and cookery expert of Weldon's Home Journal. Daily, at 3 p.m., well-known food and cookery experts from leading women's magazines, will perform the public ceremony of unsealing a pre-sealed cooker. A similar ceremony will take place at 6.45 p.m. when celebrities from TV, radio and film worlds will participate.

In addition there will be continuous demonstrations of hot and cold cookery, as well as attractive displays of refrigerators, water-heaters and other food preparation appliances. Of particular interest is a cooker designed for the use of blind housewives.

Productivity Team examines Managerial Techniques

INVESTIGATION of the aggressive American approach to improvements in manufacturing methods and the continuous reduction of operating costs was the task of the last of the British teams to visit the United States under the plans of the Anglo-American Council on Productivity. It has not been clear why managerial techniques well known in this country seem to be applied so effectively in America. Under the heading "Industrial Engineering" the team attempts to give the answer in a report published this week.

Three factors were found of over-riding importance: (i) the sharp and urgent competitiveness of the U.S. economy; (ii) the ever-present cost-consciousness, among all ranks in industry and commerce, and the rapid marshalling of cost figures; (iii) the concerted application of modern managerial techniques by the industrial engineer. Much of the report is concerned with the functions of the industrial engineer: his art is defined as "the application of basic scientific and engineering knowledge and certain analytical techniques to the methods of operating an organisation in industry and other appropriate fields." Unlike the production engineer, the industrial engineer is not a specialist; he is concerned with bringing together scientists, technologists and others to promote productive efficiency.

In their report, the team lays great stress on the spirit of competitiveness pervading industry in the United States. They feel that this provides the drive for using many of the techniques of industrial engineering and cost control which they describe. It is in connection with competitiveness that they make recommendations concerning monopolies legislation in Great Britain. They feel that this should be considerably strengthened and its range extended to ensure competitive conditions. As a first step, they recommend that Parliament should consider enforcing by law that trade and industrial associations (and trade unions) should publish any rules or agreements which bind their members. The team records its opinion that this is essential to a rise in efficiency and a fall in costs.

In this connection, the team finds that American trade unions are more exacting in wage demands than British, and that by this aggressive attitude, they have forced management into constant improvement of its methods of production.

TV Sales now bear Comparison with 1953

JUNE figures for the sale of radio and television sets, issued last week by the R.T.R.A. showed the normal falling-off in demand in anticipation of the summer. The fall was only slight in both cases. Compared with last year, it will be noted that sales of sound radio continue to be consideraby greater, but another notable fact is the better comparison now existing in TV sales for the two years. May was of course the bumper month in 1953 but June saw only the aftermath of the coronation rush. Last June's figures were thus only 2·03 below the 1953 figure compared with the May difference of 12·73. Average number of sets sold per shop was:

	1954	1953
Radio:		
May	8·89	7·07
June... ...	8·34	5·86
Television:		
May	6·01	18·74
June... ...	5·69	7·72

PERIOD FITTINGS FOR TUDOR BUILDING

SOMETHING out of the ordinary in interior lighting fittings was designed for the new branch of Martins Bank Ltd, opened recently in the High St, Shrewsbury. The building involved, known as Owen's Mansion, was built in 1598, and in converting the premises to suit their requirements the Bank have carefully preserved the period atmosphere, not only in the exterior design but also inside. Choice of interior lighting equipment had therefore to coincide with this desire.

The installation consists of eight laylights behind each of which are six channel type fittings with 40 W fluorescent tubes. The laylights are glazed with sand blasted rimpled glass and fitted with wrought iron grilles based on the Tudor design from Hampton Court Palace. This lighting equipment was designed and made by the Edison Swan Electric Co., Ltd., and local contractors, G. H. Smallwood and Co., Ltd., carried out the installation.

Special laylights in Martins Bank, Shrewsbury, blend with the Tudor architecture. Inset shows the exterior of the premises which were built in 1598

ANOTHER REFRESHER FOR PLANT ENGINEERS

FOLLOWING our report last week of Nottingham University's refresher course for works' and plant engineers, we have news of another similar course being organised on Tyneside by the Incorporated Plant Engineers. This is the latest in a series of such courses which have hitherto proved to be most successful. They began in Bristol in 1949 when there were 233 enrolments, and in succeeding years they have drawn even greater attendances.

The course now being organised is to be held at King's College, Newcastle, beginning on 19 Oct. and extending over 19 Tuesdays. Subjects will include planned maintenance, lubrication, space heating, combustion and steam raising, switchgear, generation of power from process steam, safety precautions, industrial lighting, and others. Fee for the course is £3. 3s., and full particulars may be obtained from the Course Secretary at Stephenson Bldg, Claremont Rd, Newcastle.

POLYTHENE PRICE REDUCED

AT a press conference held last week, Imperial Chemical Industries Ltd,. announced that due to increased sales of their "Alkathene" brand of polythene, a corresponding step-up in output of their factory had led to a reduction in production costs. In order to further improve the position of the product, which the company have now been making for the past fifteen years, the benefit of economies secured would be passed on to customers by a price reduction of 3d. per lb making the price 3s. 2d. per lb from 1 Sept.

Electrical Industry's Golf Finals on 4 October

FULL details of the programme for this year's Electrical Industries Golf Championship Final were issued by the secretary last week. The final, as previously announced, will take place at Moor Park, Rickmansworth, Herts, on 4 Oct. Competition in the morning on the High Course will be the 18 holes Medal Round for the Sir Montague Hughman trophy. The runner-up will receive the trophy presented by J. L. Wilson Esq., and the competitor returning the best scratch score will be awarded the trophy presented by J. Y. Fletcher Esq. Throughout the day entrants will compete on the same course for the Veterans trophy, and on the West Course for the Visitors' Rose Bowl.

This year's dinner is to be held at the Park Lane Hotel in London, where accommodation has been reserved for 400. Entry forms and dinner tickets may be obtained from any area secretary or from Mr F. Farthing, Magnet Hse, Kingsway, W.C.2.

Interior and exterior views of London's latest showroom at 28 Old Brompton Road, South Kensington, where Barclay and Sons Ltd., sole distributors, are staging demonstrations of Paladin electric food mixers for both trade customers and the general public. This centre from which Mr J. E. H. Fildes Moss, new sales manager, will work, was formally opened last week with a demonstration by Mrs Margaret Drake

Rising Costs force E.E.B. Tariff Increase

TARIFFS in the Eastern Electricity Board's area are to be increased next year, it was announced at last week's meeting of the Consultative Council following a letter from the Board. It will be recalled that in July the Council were given an asurance that the existing tariff structure will remain unaltered until 1 April next. That assurance will of course be honoured because any rise in charges cannot be effected before that date, but provided the new proposals are approved without undue delay it is expected that the new rates will be in force soon after that date. What the alterations will entail is still a matter for conjecture. Proposals will be considered at the end of this month and will be passed to the Consultative Council for their views. The Council's Tariffs sub-committee is to examine the new charges and report to the Council before their next meeting on 4 Nov.

Commenting on the letter last week, the Council's chairman, Ald. W. J. Bennett said it would be interesting to discover what had given rise to this latest decision. Increases in costs, wages, etc, were blamed. The July letter stated that charges would be stabilised in spite of the fact that increases in costs had surpassed the price of electricity, so as to keep down living costs and in the interests of national economy. We reported at that time that popular belief was that the letter was a subtle form of warning.

Covering Bars in Substations

SEEKING a neat and economical method of covering copper bars in substations, Mr H. Lloyd-Williams, sub-area engineer for the Western sub-area of the London Electricity Board, has found one practical solution, it is reported in the Autumn number of *London Electricity*. The method consists of slipping loose tubing, made out of a special type of plastic, over the copper bar and then shrinking it to a tight fit by the application of heat —this was done by passing a heavy current through the conductor being covered and applying hot air externally. It is stated that the finished job is strong, the insulation being capable of withstanding pressures up to 20 kV.

Domestic Appliances in Stockholm

ELECTRICAL exhibits were well in evidence at the St. Erik's Fair in Stockholm where a total of 49 U.K. concerns participated in the British Pavilion. Business has been brisk so far especially on Britain's day, which this year was 7 Sept. (Tuesday). Domestic appliances predominated. Among electrical exhibitors were Berry's Electric, the Brush Group, English Electric, Ever Ready, Hoover, Kenwood Manufacturing, Pifco, Smith's English Clocks and Thor Appliances.

The First Half-Century

If I ever got a holiday I would go to the Isle of Wight to study rapid transit on the spot. There are two railways there, worked on enlightened principles. One principle is that the Island is really a Continent, and no one should be enabled to cross it in less than a day. The trains are, therefore, timed not to connect anywhere. There are steamers too. They are run so as to be as inconvenient as possible, lest they take away the custom from the railways. Once a train went faster than the coach. The coach expostulated and the railways apologised. There are many cheap excursions advertised, but they are all by impossible trains, which arrive at their destinations after the last trains back have gone. It may be said this is of no interest to electrical readers. It is though, because they will all want to apply their one panacea—electrification. I do not think this is the cure. —*From our issue of 8 Sept.*, 1904.

SALESMEN REBUKED

SCOTTISH salesmen were criticised for their lethargic attitude towards the American tourist last week. The critic was Mr Alexander Brackenridge, chairman of the U.S. committee of the Scottish Council (Development and Industry) and he was addressing the Glasgow branch of I.S.M.A. When it came to selling goods to the tourist, sales managers were asleep, he said. He reminded his audience that hundreds of American tourists visited these islands annually and each one was allowed to take back $500 worth of goods free of duty. For a family of four that meant $2,000 worth of business but salesmen had been dabbling in small items only. The tourist wanted to spend money, Mr Brackenridge said, and if he did not spend it in Britain, he would in Paris or another European city. There was a great opportunity for trade if only salesmen would consider the tourist's requirements. Sell expensive articles, Mr Brackenridge recommended.

Limits for Anti-Static Rubber

NOTES on limits for resistance values of anti-static rubber products used in hospitals are set out in a National Health Service memorandum published this week. A previous statement had set the limits at 10 megohms maximum and (with two exceptions) 50,000 ohms minimum. It is now stated that the lower limit need not apply to items of anæsthetic equipment which are unlikely to be the only buffer between patient and earth. The memorandum also gives attention to vinyl thermoplastic products having anti-static properties. These may be used subject to the same limits, etc., as conducting rubber. There is a new general recommendation that tubing of anti-static material, which is liable to be cut into short lengths, should be marked with an indelible yellow line at least ¼ in. wide throughout its length.

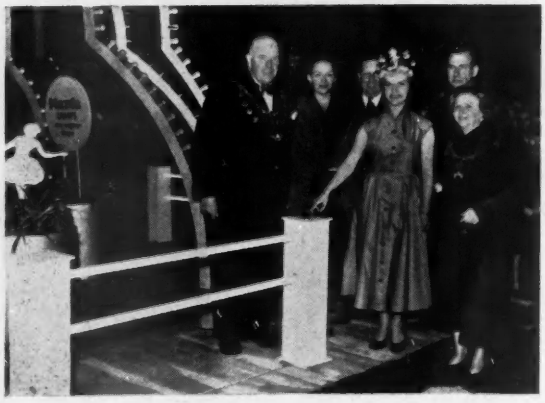
Radio Show Record

Total attendance at the National Radio Show, which closed last Saturday, was 315,970, an increase of 20,000 on last year. It was said to have been the most successful of the 21 held.

Last month a consignment of 53 special mobile welding plants left the works of Petbow Ltd., at Sandwich, Kent, bound for the Dutch Army. The order is photographed leaving the factory. The Dutch Army has standardised on Petbow welding plants and this latest batch brings the total number despatched this year to 112. The plant is a standard Viceroy set powered by a Ford V8 engine. One modification is the fitting of an auxiliary 3 kW generator for small tools, and another to allow the plant's use for underwater welding and cutting

10,000 Baghdad Catalogues in English and Arabic

OFFICIAL catalogue of the Baghdad Trade Fair to be held from 25 Oct. to 8 Nov., has been completed and copies are on their way to the Middle East. It contains over 500 pages with descriptive entries of the 450 British exhibitors. Produced by Associated Iliffe Press for British Overseas Fairs Ltd, it is really two catalogues in one. Reading from the front to centre it is printed in English, and from back to centre in Arabic. About 10,000 copies have been printed, but demand is expected to be heavy and it is unlikely that copies will be available for distribution in this country. However, the catalogue may be examined at the offices of the Fair's publicity agents, O'Sheas Ltd., 101 Fleet St, E.C.4. Incidentally, Iliffe's were also responsible for producing the official posters, design for the special motif and other work.



First candidate for the Mazda Queen of Light title was chosen at Morecambe recently. She is Miss Marguerite Mitchell, seen switching on the Illuminations at Happy Mount Park. With her are the Mayor and Mayoress of Morecambe and Miss Jean Kent. Miss Mitchell is the first of 19 finalists who will compete for the title in Dec.

NEWS IN BRIEF

We hear that the N.E. Electricity Board are to build a new service centre in Middle St, Blackhall.

Fifteenth National Conference for the Preservation of the Countryside will take place at Shanklin, Isle of Wight, between 7 and 9 Oct.

Merseyside and N. Wales Branch of E.I.B.A. held their annual golf tournament at Heswall Golf Club on 1 Sept, preparatory to the National Final next month. Winner was Mr G. A. Baker of Sangamo Weston. £425 was raised for the Benevolent Fund as a result of the day's activities.

A visual indication of the approach of trains running into Euston has been installed in the arrival bureau.

Ediswan Bijou adaptors are now being supplied in a new type carton specially designed for counter or window display.

Sayings OF THE WEEK

"I am assured by my nuclear physics friends that university reactors can have no benefit for training personnel, because they no more resemble a modern reactor than James Watt's steam engine resembles Bunnerong (Sydney's major power station)" . . . PROFESSOR J. P. BAXTER, director of the Sydney (N.S.W.) University School of Technology.

"What was the purpose of nationalisation? Was it ever more than a political stunt to catch ignorant voters? I cannot speak of the railways, but I had some experience of electricity. It was an industry which was handed over to new leaders who had no knowledge or experience of it. Inevitably they were extravagant themselves, and inevitably they were as putty in the hands of experts" . . . MR O. A. SHERRARD, writing *to the Daily Telegraph.*

"In kitchens, more ventilation is necessary than at present laid down, and they could be kept comfortable only if the products of gas combustion can be led directly into the open air" . . . PROFESSOR G. P. CROWDEN, speaking to the British Association last Thursday.

COMPANY ACTIVITIES

THE dearness of coal accompanied by occasional hold-ups in supplies is occasioning industry generally some mighty headaches.

In a forthcoming Chamber of Commerce conference the matter will be thrashed out. But it is evident that despite any resolutions or even improvements in the supplies, many industrialists are determined at suitable opportunities to install alternative forms of industrial power. Oil is being taken up by an increasing number of factories, especially as with the country's greatly increased refinery capacity, oil supplies are now readily available.

This trend also explains the increased activity of Electric Furnace Co., trading profits of which last year rose to a record figure of £188,453. Long term prospects of such a company as the chairman, Mr D. F. Campbell, explained in his annual review, must be promising. One important reason is that whilst the cost of electricity has no more than doubled in the past 15 years, the price of many types of coal has risen four-fold. The £1 Ordinary shares are around £2 but it is as much as nearly nine times covered so that the 5% yield is very reasonable.

In view of the mighty records of some radio and television concerns the results of A. C. Cossor are a trifle disappointing. Turnover for the year to March last increased only slightly from £7·25 million to £7·34 million. On the other hand these totals follow a substantial 1952/53 expansion. However, consolidated trading profits rose from £465,000 to £557,000 and the balance sheet position is healthier. As a result of last October's rights issue, bank overdrafts have been reduced together with interest charges which offset to some extent the increased tax charge.

Lord Burghley is wise, I think, not to push up the dividend of 10% in the circumstances. The cover over the present equity is not particularly great. Earnings for the past year were just under 16%, which would be converted into 23·7% if E.P.L. were excluded. Shareholders however should benefit during the current year because of the recent relaxation of hire-purchase restrictions and by the success attending the group's radar equipment sales.—*From our City Correspondent.*

H. J. Baldwin and Co. Ltd.

The dividend for the year ended 31 Mar. last is maintained at 20% with a final of 10%. The consolidated trading profit for the period is £95,772 compared with £101,835 for the previous year. The net profit attributable to the parent company is £28,783 (*£29,460*).

Britannia Electric Lamp Works Ltd.

This is another non-ring lamp firm which reports a sharp rise in profits. The directors state that the figures reflect expansion of the group's business noticeably good results having been obtained by the subsidiary companies in spite of increased material and labour costs that came into effect towards the end of the year.

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	81,898	27,372	28	12½	10/–	9/6
1951	135,564	43,855	48	12½	10/6	10/3
1952	130,951	34,258	37	12½	10/9	10/7
1953	119,783	21,188	22	12½	10/6	10/3
1954	177,629	50,931	53	12½	10/6	10/3

A. C. Cossor Ltd.

With the group profit for the year ended 31 Mar. last at £532,039 being £62,833 higher than for the previous year, the dividend is maintained at 10% on the Ordinary capital as increased last Oct. by the issue of 1,600,000 shares of 5s. at 6s. each. The chairman, Lord Burghley, says that 1954-55 began with some slackness in the trade but the end of hire-purchase restrictions has released a considerable latent demand, and the company looks forward to a better year than at one time seemed likely.

Year to Mar. 31	£ Trading Profit	£ Net Profit*	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	247,760	93,630	23	—	12/6	7/3
1951	481,169	164,213	47	—	17/7	8/6
1952	487,977	111,465	30	10	13/8	8/–
1953	469,406	59,531	13	10	11/4	6/3
1954	532,039	98,967	15	10	10/10	7/–

*Available for parent company.

Electric Furnace Co. Ltd.

Although the demand for metal-melting equipment is somewhat reduced, owing to the over-expansion of normal capacity during the period of the Korean rearmament programme, Mr D. F. Campbell, the chairman, considers the outlook for the current year is satisfactory, for the company is fortunate in the wide scope of its activities and the diversity of industries served. Last year's profit figures were records for the company. The directors have decided to build a new factory in the London area to meet the rapidly growing requirements of the group and particularly of the subsidiary, Electro-Chemical Engineering Co.

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	84,738	17,248	29	8	—	—
1951	122,851	37,511	80	10	—	—
1952	142,101	52,085	116	10	22/10	20/–
1953	188,453	45,621	96	12½	22/–	11/1
1954	288,659	78,573	87	10*	23/6	23/3

*Plus 100% capital bonus.

Hackbridge Cable Holdings Ltd.

The reduction in trading profit for the past year, to which we referred last week, is clearly indicated in the accompanying table. The chairman, in his report, states that improvements and additions to the firm's means of production have been continued during the year at a cost of £64,700. Good progress is being made in sheathing cables with aluminium by the direct extrusion process as an alternative to lead. Development work continues.

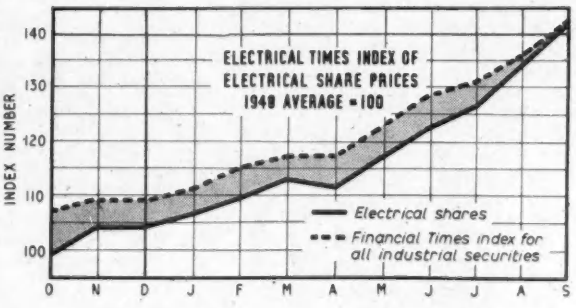
Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	328,809	123,000	45	20	14/9	11/3
1951	247,406	71,247	25	20	15/9	9/9
1952	228,245	87,009	32	20	11/9	9/1
1953	468,308	157,307	59	20	13/–	10/4
1954	309,539	111,857	40	20	15/4	11/3

Palestine Electric Corporation Ltd.

The Israeli Government have now made an offer for the acquisition of the Ordinary and "A" Ordinary stock at 29s. 6d. sterling payable at 15 half-yearly instalments, or 21s. 6d. sterling payable on 15 Oct. next for each £1 unit. Under the terms of the first alternative the half-yearly instalments—2s. each except for the last, which will be 1s. 6d.—will commence 15 Oct. next. Interest from 1 Oct. will accrue on the amount outstanding at 4% p.a. Holders accepting this offer will receive 4% registered sterling "A" stock of the State of Israel. Stockholders accepting will not be entitled to any dividend for 1953 or subsequently. They may take either offer; or partly one and partly the other. Latest date for acceptance is 30 Sept. The directors propose to accept one or the other in respect of their own holdings. Under the scheme 47,919 Ordinary £1 shares are to be allotted free for the benefit of the managing director, Mr A. Rutenberg, and his family in recognition of his services.

Parmiter, Hope and Sugden Ltd.

At this meeting last week, Mr E. W. Sugden, the chairman, stated that sales of recent new designs of house service fuses continue to expand and new ranges of high-breaking capacity cartridge fuse-links



The boom in share prices continues and the rise in electrical shares is particularly noticeable. The Electrical Times index for all electrical shares increased by 7·5 to 142·1 during August, while the Financial Times index for all industrial shares rose from 135·6 to 142·5

have been produced and tested in recent months. Further new designs are in hand to meet special overseas markets.

Phoenix Telephone and Electric Holdings Ltd.

With improved trading results, the dividend is raised by 5%. Mr G. F. Shipman, the chairman, reports that output, and sales, to date during the current

Year to Feb. 28	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1951	197,831	39,129	47	10	8/3	8/3
1952	214,720	44,787	44	10	6/6	5/–
1953	240,950	48,709	39	10	7/9	6/4
1954	269,092	54,483	41	15	9/1	8/–

financial year show increases as compared with the corresponding period of last year, and the volume of orders in hand is sufficient to absorb output for many months ahead.

Power Securities Corporation Ltd.

New capital is being raised by offering 400,000 Ordinary £1 shares to shareholders at 30s. a share on a one-for-two basis.

Richardsons Westgarth and Co. Ltd.

The large number of contracts completed during the past year were chiefly responsible for the record group trading profit of the period, but this has only been achieved with considerable difficulty, Mr O. J. Philipson, the chairman, states. Despite a number of marine

Year to Mar. 31	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1950	646,120	280,862	48	12	10/8	6/–
1951	683,189	241,786	35	12	13/3	9/7
1952	816,699	248,771	36	12	10/7	8/4
1953	898,400	346,428	47	15	11/1	8/6
1954	1,121,454	342,489	35	15*	12/7	6/5

*Plus 33⅓% capital bonus.

cancellations, the order book at 31 Mar last was still a heavy one and should keep the company's works steadily occupied for two or three years. But he warns that there is no cause for complacency, for on the marine side new orders are few and far between. Although supplies of steel showed some improvement during the past year, nevertheless, particularly in regard to heavy plates for boilers, supplies left much to be desired both as to quantity and sequence of deliveries, he adds.

Ultra Electric Holdings Ltd.

Subject to Treasury consent, it is proposed to issue by way of rights for cash 372,500 5s. "A" Ordinary shares and 357,500 5s. "A" Ordinary by way of capitalisation of reserves. The basis will be one-for-four in each case.

Dividends Declared

British Thermostat Co. Interim of 7½% (*same*) but on capital increased by 5% scrip issue.

Chloride Electrical Storage Co. Interim of 5% (*same*).

Crofts Engineers (Holdings). Interim of 7½% (*15%*) on doubled capital.

Telegraph Condenser Co. Interim of 5% (*same*) but on doubled capital.

Walsall Conduits Ltd. Interim of 20%.

ELECTRIC SUPPLY NEWS

Blyth

Work is in hand for the supply of electricity to about 220 houses at present served by gas at Malvins Close. The houses are owned by the National Coal Board and the tenants have been campaigning for about 20 years to have electricity installed. The North-Eastern Electricity Board are building a new substation and it is expected that cables will be laid to the houses by the end of Nov.

Crawley

Frequent failures in the power supply in this area has drawn protests from local manufacturers. It is stated that three times last month the supply failed through rooks and squirrels coming into contact with lines. Mr F. A. Avery, district manager to the South Eastern Electricity Board has said that part of the trouble was due to a plague of grey squirrels.

Cumberland

The County Planning Committee has approved proposals by the North-Western Electricity Board for an 11 kV line and low voltage line to supply electricity to the villages of Gamblesby and Biglands and also for the reinforcement of the 11 kV system at Brampton.

Durham

The Rural Council has approved plans by the North-Eastern Electricity Board for the construction of a 6 kV overhead line at Middle Rainton.

Eastern Board

A further 4,566 consumers were connected by the Eastern Electricity Board during June. That figure includes 113 farms. In the other work of the sub-areas, 47·3 miles of h.v. mains were laid together with 34·8 miles of low voltage line. Since 1 April this year the Board has added 13,061 consumers, including 222 farms.

Elland

Preliminary work has started on the B.E.A.'s power station at Lowfields, Elland. The first of the three main civil contracts is for remaking the approach road and moving earth for the building of coal sidings. The station is being built on a large site on the Brighouse side of Elland in a bend of the River Calder. The site covers 40 acres and includes part of Elland U.D.C. sewage works, which are being remodelled at a cost of £12,000 to be borne by the B.E.A. The station will have an installed capacity of 180 MW provided by three 60 MW sets. There will be two cooling towers.

North Staffs

Reviewing progress in the rural development programme of the Midlands Electricity Board, Mr H. A. P. Caddell, manager of the North Staffs sub-area has said that the number of North Staffordshire farms with mains electricity has been doubled in the last six years, and over £100,000 is being devoted to the continuation of the work by the Board during the current year. Shortly after the Board was established in April, 1948, the sub-area — which covers the whole of Staffordshire north of Stafford, part of Shropshire near Market Drayton and a small part of Cheshire at Congleton— prepared a long-term rural development plan to continue the work which had been carried out by the North West Midlands Joint Electricity Authority. It was found that 1,673 farms in the sub-area were already on supply and it was estimated that to connect the remaining villages, farms and other rural premises would involve a capital cost of £850,000—a 1949 figure which would probably be nearer £1,000,000 today. The development plan included 50 neighbourhood schemes, many relating to areas which already had "backbone" high voltage lines. Expenditure on rural development totalled £12,375 in the first year and has risen gradually each year, exceeding £90,000 in the financial year which ended on 31 Mar., 1954. At this date there were 2,930 farms on supply, compared with the 1,673 in 1948, and supply had also been provided to many other rural premises.

Northumberland

The B.E.A. have applied to the Ministry of Transport for permission to construct a 66 kV overhead line across the River Blyth near Sleekburn, Northumberland. The line is intended to reinforce the electricity system to meet a growing demand in the area.

LIGHTING SCHEMES

Bawtry. The parish council have completed plans for the construction this year of a special trunk road lighting scheme for the section of the Great North Rd which passes through the township.

Blackpool. It is proposed to seek consent to borrow £85,532 for street lighting improvements.

Coleraine. The borough council has adopted a scheme to replace existing gas street lighting by electricity at a cost of £30,000.

Greenock. Application has been made for consent to borrow £16,450 for re-lighting of certain main traffic streets and for lighting on the Branchton Farm housing estate.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

10 Sept.—Belfast T.C. Fire extinguishing equipments for substation.—Advertised in 19 Aug. issue.

10 Sept.—Eire. Installation in dispensary and clinic at Blackrock.—See 19 Aug. issue.

10 Sept.—Fifeshire. Electrical installation at Auchtermuchty secondary school. —See 2 Sept. issue.

10 Sept.—Mansfield T.C. Concrete steel columns, lanterns and other fittings for main road lighting.—See 26 Aug. issue.

10 Sept.—West Riding. Electrical fittings for County Architect's Dept.—See 26 Aug. issue.

11 Sept.—Durham T.C. Installation at Dunston Hill schools, and Greatham school.—See 2 Sept. issue.

11 Sept.—Newmarket U.D.C. Mercury vapour street lighting units and tungsten units with concrete columns.—See 19 Aug. issue.

11 Sept.—Spilsby (Lincs) R.D.C. Power points in 36 dwellings.—See 2 Sept. issue.

11 Sept.—Stone U.D.C. Group A street lighting in Stafford and Eccleshall Rd. —See 2 Sept. issue.

11 Sept.—Wayland (Norf.) R.D.C. Installation in 10 houses.—See 2 Sept. issue.

13 Sept.—Batley T.C. Lighting and power points at Victoria Ave cleansing depot.— See 2 Sept issue.

13 Sept.—Dublin T.C. Installation in Technical School for Girls in Crumlin Rd.—See 29 July issue.

13 Sept.—Middlesex. Lamps for year ending 31 Oct., 1955.—See 19 Aug. issue.

13 Sept.—N. Ireland. Lamps to Fermanagh County Hospital and Erne Hospital, Enniskillen.—See 2 Sept. issue.

13 Sept.—Peterlee (Dur.). Installation in 310 houses on Acre Rigg sites.—See 19 Aug. issue.

13 Sept.—Stepney B.C. Lighting and power points at Paving Depot.—See 2 Sept. issue.

14 Sept.—Antrim. Electrical installation for new nurses home at Dabraida Hospital, Ballycastle. T. J. Sheehan, secretary, Dabraida Hospital. Deposit £3. 3s.

16 Sept.—Belfast T.C. Metering equipment.—Advertised in 12 Aug. issue.

16 Sept.—Belfast T.C. Installation in Ballygomartin intermediate school.—See 26 Aug. issue.

17 Sept.—Chigwell U.D.C. Repairs, etc., to electrical installations in 180 houses at Chigwell, Loughton and Buckhurst Hill. Names by above date to Architects, Tooley and Foster, Midland Bank Chambers, Buckhurst Hill.

17 Sept.—Sheffield T.C. Installation in 132 dwellings on Greenhill-Bradway estate.—See 19 Aug. issue.

17 Sept.—Wolverhampton T.C. Mercury and tungsten street lighting, including columns, lanterns, auxiliary control gear and time switches.—Advertised in 26 Aug. issue.

17 Sept.—Wortley R.D.C. Class A street lights at Chapeltown, nr. Sheffield.—See 12 Aug. issue.

17 Sept.—Yiewsley and W. Drayton U.D.C. Steel columns with lanterns, lamps and control gear.—See 26 Aug. issue.

18 Sept.—Burton-on-Trent T.C. Equipment for three street lighting schemes.— Advertised in 19 Aug. issue.

18 Sept.—Dublin T.C. Supply of 100/ 200 W fittings for public lighting dept. Finance Dept., City Hall.

18 Sept.—Pembrokeshire. Electrical installation in new fire station and brigade headquarters. Names by above date to W. Barrett, county architect, County Offices, Haverfordwest. Deposit £2. 2s.

18 Sept.—Wirral U.D.C. Steel columns with lanterns, etc., for street lighting at Irby.—See 26 Aug. issue.

20 Sept.—Barnes T.C. Supply and installation of about 167 140 W sodium lanterns lamps and control gear with concrete columns, for improvements to about 3¼ miles of main road lighting. W. R. Shepherd, Borough Engineer and Surveyor, Municipal Offices, Sheen Lane, S.W.14.

20 Sept.—Brentford and Chiswick T.C. Wiring of 146 houses on Ealing Rd estate. Borough Engineer, Town Hall, Chiswick. Deposit £4. 4s.—Advertised in this issue.

20 Sept.—Lancashire. Wireless equipment for ambulance service.—See 12 Aug. issue.

20 Sept.—Lancashire. Supply of various electrical equipment, including refrigerators, immersion heaters, fires, clocks, lamps, etc., etc. Applications by above date to County Architect, County Hall, Preston.—Advertised in this issue.

20 Sept.—Rochdale T.C. Lighting and power installations at Lea Hall youth club, Smith St. Borough Surveyor, Town Hall.

20 Sept.—Wigan T.C. Electrical work in housing schemes. Borough and Water Engineer, Municipal Buildings, Hewlett St.

20 Sept.—Torquay T.C. Electrical installation in 13 old people's dwellings on Watcombe estate, 4 houses and 4 bungalows on Hele estate. Apply by above date to Borough Surveyor, Town Hall. Deposit £2. 2s.

21 Sept.—Melford (Suff.) R.D.C. Wiring in 328 houses.—See 26 Aug. issue.

22 Sept.—Bacup T.C. Street lighting scheme on Tunstead Rd estate involving supply and laying of cable, concrete columns, etc. Street Lighting Superintendent, Irwell Ter.

22 Sept.—Peterhead T.C. Electricity services in site preparation at Clerkhill.— See 2 Sept. issue.

22 Sept.—Wembley T.C. Conversion of street lighting to sodium vapour discharge lighting including erection of 471 45 W and 60 W lamps. Borough Treasurer, Town Hall. Deposit £2. 2s.—Advertised in this issue.

22 Sept.—Kingston-on-Hull T.C. Light and power installation at Jervis secondary modern school for boys. City Architect, A. Rankine, Town Hall. Deposit £1. 1s.

23 Sept.—Co. Antrim. Installation in school at Larne.—See 2 Sept issue.

23 Sept.—Newark-on-Trent T.C. Group B street lighting in Bowbridge and Boundary Rds. Same for Sherwood Ave and Beacon Hill Rd.—Advertised in 2 Sept. issue.

24 Sept.—Belfast T.C. Equipment for fluorescent street lighting.—Advertised in 2 Sept. issue

27 Sept.—Plympton (Dev.) R.D.C. Seven sets electrically driven sewage pumps.— See 19 Aug. issue.

30 Sept.—Thetford T.C. Concrete columns to group "A" with lamps, lanterns and auxiliary equipment along A 11. —Advertised in 26 Aug. issue.

1 Oct.—Middleton T.C. Electrical installation in 80 houses on Hollin estate. Borough Architect, Town Hall.

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 125 queries answered this week

"County" vacuum cleaners, makers of? G.E.—Electrix Ltd., Sterling Works, Dagenham.

"Willow" combined saw bench and grinder, makers of? T.E.—British Rawhide Belting Co., Ltd., 246 Gt. Portland St, W.1.

Rubber rollers for "Apex" washing machine wringers, recoverers of? G.W.C. —Apex Electrical Eng. Ltd., 118 Camp Rd, Leeds 7; W. Carr and Co., Ashby Rd, Brockley, S.E.4; J. L. Hancock Ltd., Herga Hse, Vincent Sq, S.W.1.

"Streamiron" auto-controlled irons, makers of? W.W.L.—Thermionic Products Ltd., Morris Hse, Jermyn St, S.W.1.

"Angelus" fires, makers of? S.W.B.— Sperryn and Co., Ltd., Moorsom St, Birmingham 6.

"Alder" washboilers and rubber junction boxes, makers of? T.B.C.—"Alder" washboilers—Alder Electric Appliances Ltd., Rushworth St, Burnley, Lancs; Rubber junction boxes—W. W. Haffenden Ltd., Richborough Rubber Works, Sandwich, Kent.

"Golden Arrow" automatic irons, makers of? D.B.—Tym's Electric, Systym Works, Kennard Rd, E.15.

11 Oct.—Lurgan (N.I.) T.C. Supply and installation of switchboards, fuse boards, cables, conduits, etc., for lighting and power distribution at Castor's Bay waterworks. E. Reid, consulting engineer, College Gardens, Belfast. Deposit £3. 3s.

14 Oct.—Grimsby T.C. Electrical installation in new police H.Q. in Victoria St. J. V. Oldfield, Borough Engineer and Architect, Municipal Offices, Town Hall Sq. Deposit £5.

15 Oct.—Strabane (N.I.). Wiring of Strabane Presbyterian church. T. T. Houstan, chartered architects, 26 College Gardens, Belfast. Deposit £3. 3s.

22 Nov.—N. of Scotland H.E. Board. Boiler feed pumps at Carolina Port power station.—Advertised in 2 Sept. issue.

No date stated.—Wigtown. Electrical installation in 34 houses at Kirkcowan and 50 at Dunragit. County Architect, 23 Lewis St, Stranraer.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

27 Sept.—Australia. Supply of weatherproof transformers for Fairfield and Holroyd substations of Electricity Commission of N.S.W., Kelvin Hse, Castlereagh St, Sydney. B.o.T. (Ref.: ESB 20452/54).*

27 Sept.—Australia. Supply of 33,000 V three-phase oil immersed natural cooled regulating transformer with 30,000 kVA through-put for Blacktown substation of Electricity Commission of N.S.W. Contract 304. B.o.T. (Ref.: ESB 20453/54).*

27 Sept.—Persia. Supply of transformers, insulating materials, generator control panel boards, swinging steel instrument panels, h.t. and l.t. control panel boards, and cable and connection boxes, for generation and primary and secondary distribution of electricity. (No. 65-22-007-4 (File No. 41)). Procurement Office, Iran-American Joint Fund for Tech. and Economic Development, Ave. Sepah, Teheran. B.o.T. (Ref.: ESB 20515/54).*

30 Sept.—South Africa. Tenders (C.8159) invited for 24,000 ft grooved copper contact wire 0·25 sq in. Stores Dept., S. African Railways. B.o.T. (Ref.: E.S.B. 21055/54).* Tenders also invited by S.A. Railways (F.8118) for six air-cooled diesel-alternator sets, with switchboard spares, etc. B.o.T. (Ref.: ESB 21052/54).*

1 Oct.—Australia. Supply of three 200W 12 V d.c. steam turbo-generators for Melbourne Harbour Trust Commissioners, 29 Market St, Melbourne. Documents from A. E. Turner and John Coates and Co, Ltd, Victoria Hse, Melbourne Place, Strand, London W.C.2.

5 Oct.—Uruguay. Administracian General de las Usinas Electricas y los Telefonos del Estado requires supply of 25,000 dry batteries of 1·5 V for microphonic feeding of battery subscribers. (Tender No. 2319). B.o.T. (Ref.: 20699/54).*

7 Oct.—Australia. Supply of six 11,000 V automatic outdoor type switchgear units, 50 c/s, 3-phase, for Southern Electric Authority of Queensland, Boundary St, Brisbane. Contract no. 54/14. B.o.T. (Ref.: ESB 20793/54).*

8 Oct.—New Zealand. Auckland Power Board requires 50,000 yd of 0·075 sq in. weatherproof braided aerial cable to be used for 400 V a.c. overhead lines. Deposit £75. B.o.T. (Ref.: ESB 21176/54).*

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 7 September

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	246	+6	229
„ (3 months)	239½	+2½	215½
LEAD, refined pig, min. 99·97% purity (cash)	100½	+1½	96½
„ (3 months)	99½	+2½	91½
TIN, refined, min. 99·75% purity (settlement)	734	+4	618½
„ (3 months)	734	+5	611½
ALUMINIUM, ingots 99-99·5%	156	—	150
ZINC, virgin, min. 98% purity (cash)	81	+3½	71½
„ (3 months)	80½	+3	70 15/16
RUBBER No 1, RSS, spot (per lb.)	20⅝d.	+⅛d.	19⅛d.
„ c.i.f. basis, ports, Oct. (per lb.)	20⅝d.	+⅛d.	19⅛d.
ARMOURING:			
Galv. Steel Wire (0·104 in.)	52	—	50½
Mild Steel Tape (0·014 in.)	40½	—	40

14 Oct.—New Zealand. Tenders (P. and T. 150/7213) invited for supply of various electric lamps, and associated fittings by Post and Telegraph Dept., Wellington. B.o.T. (Ref.: ESB 21122/54).*

15 Oct.—Tangier. Construction of l.t. overhead line in Anfa district of Tangier and a 22,000 V o.h. line along Airfield Rd, for Water and Electricity Supply Board, 4 Rue Vermeer, 3ème Etage, Tangier. B.o.T. (Ref.: ESB 20165/54).*

19 Oct.—Portuguese W. Africa. Supply of various equipment for supply of electricity to town of Gabela. Documents available from Hugo International of Rue Crucifixo 76-4°, Lisbon, at Esc. 120,000. Local representation essential. B.o.T. (Ref.: ESB 20389/54).*

29 Oct.—India. Supply of 30,000 kW steam generating plant. Tender No. Project/SE-2/2101-E/I. Director General of Supplies and Disposals, Shahjahan Rd, New Delhi. Documents at Rs. 160. B.o.T. (Ref.: ESB 21298/54).*

16 Nov.—Belgian Congo. Tenders (No. 587/29/62/53) invited for supply, installation, etc., of equipment for electrical distribution at new airport at Leopoldville. Copy of specifications at Belgian Embassy, 103 Eaton Sq, London, S.W.1.

25 Nov.—India. Tenders (SE 2/2129.E/111) invited for supply of oil circuit-breakers, automatic reclosure, bank of capacitor and isolator switches. Director General of Supplies and Disposals, Shahjahan Rd, New Delhi. B.o.T. (Ref.: ESB, 21396/54).*

14 Dec.—Australia. Supply, erection, etc., of seven 56 MVA single-phase transformers and ancillary equipment for Snowy Mountains H.E. Authority. Contract No. 40006. Documents at £1 a set from various addresses, including Stores and Supply Branch, Head Office, Cooma, N.S.W.

Contracts Placed

Bristol T.C. Lighting and power installation at Shirehampton primary school, Buchanan and Curwen Ltd., £2,229.

Chester T.C. Installation in 142 houses at Blacon, Engineering Service Installation Ltd., £3,262.

Inverness. Distribution of electricity to dwellings at Strathnairn and Strathspey, B. French, £275,000.

Middlesbrough. Electrical equipment for Low Worsall pumping station of Tees Valley Water Board, N.E. Electricity Board, £2,656.

Gazette Announcements

COMPANIES ACTS

Ferro-Concrete and Electrical Construction Ltd. Meetings of members and creditors to be held on 1 Oct. at 15 Cromwell Rd, London, S.W.7, at 11 a.m. and 11.30 a.m. to receive liquidator's report.

Ward Electrical Engineering Co., Ltd. Last day for receiving proofs in respect of intended dividends, 15 Sept. Liquidator is A. E. Attwood, 20-21 Lawrence Lane, Cheapside, London, E.C.2.

Peerless Refrigeration Ltd. Last day for receiving proofs in respect of intended dividends, 17 Sept. Liquidator is David Morgan, 100 Park St, London, W.1.

Articair Refrigerators Ltd. At first meeting of creditors Official Receiver reported that only creditor appeared to be Inland Revenue, who obtained judgment against company last January for £1,369 and £12 costs. Company formed in Aug. 1946, with nominal capital of £10,000, of which £9,500 had been issued. It did not appear to have traded for some considerable time. Directors were Maurice Clements, Roland Walter Rowland and Lionel Arundel Taylor. Mr Clements said he did not regard company as insolvent, and considered that Mr Rowland would be willing to repay by instalments, one half of sum agreed to be due for Schedule "D" tax and profits tax between Inland Revenue and liquidator. Resolution passed for appointment of Mr J. B. Clifford, C.A., 4 Bucklersbury, E.C.4, as liquidator.

BANKRUPTCY ACTS

Public Examination

Sheffield. Albert C. Payne, electrician of 40 Springfield Rd, Wickersby, Rotherham. Public exam will take place at County Court Hall, Bank St, Sheffield, on 30 Sept. at 2 p.m. First meeting was on Tuesday (7 Sept).

First Meeting

Northampton. Frederick B. E. Hobson, trading as Hobson and Partners, electrical and mechanical engineer, at 6 Church Rd, Leighton Buzzard, and as Wilson Electrical at Wells Yard, Upton Rd, Watford. First meeting at Official Receiver's Office, 6 The Parade, Northampton, on 14 Sept at 11 a.m. Public exam on 25 Oct. at County Hall, Northampton, 2.30 p.m.

Intended Dividends

Leeds. John F. Gannon, electrical engineer trading at 11 Barclay St, Leeds. Last day for receiving proofs, 23 Sept. Trustee is R. B. Smith, York Hse, 3 Alfred St, Leeds.

BUSINESS PROSPECTS

Home

Abercorn U.D.C. Erection of 36 flats at Pant, Newbridge. Council's Architect, G. A. Atkinson, Council Offices.

Abertillery U.D.C. Erection of 86 dwellings on Swffryd site B, near Crumlin. H. J. Williams, clerk of council, Council Offices.

Altrincham T.C. Construction of public health depot. Borough Surveyor, Town Hall.

Aylesbury. New factory to be built for Wm. Moorhouse and Sons Ltd., of Beeston, Leeds.

Birkenhead. T.C. planning extensions at police headquarters costing about £35,000. Also plans approved for repairs, etc., at Woodchurch Rd school estimated to cost £60,000.

Birmingham T.C. Erection of block of 16 shops, 18 flats and offices at Tile Cross. A. G. Sheppard Fidler, city architect, Civic Centre.

Blairgowrie (Perth). Smedley's Ltd. are to build new factory in place of existing shell of Blairgowrie Cannery which is to be demolished.

Blofield and Flegg (Norf.) R.D.C. Revised scheme approved for erection of 38 houses at Caister and 10 at Thorpe.

Bolton T.C. Approval in principle given to erection of blocks up to 7 storeys on Crook St site comprising 60 flats.

Bootle (Lancs). J. Arthur Rank Organisation is to rebuild Broadway Cinema, nr. Linacre Lane.

Bournemouth T.C. Scheme approved for erection of theatre, cafe, etc., on the pier. Cost estimated at £40,000.

Bristol. J. R. Phillips and Co., Ltd., propose to build three-storey office building in King St.

Cheshire. Scheme approved for annexe to new county offices costing about £55,000.

Chester-le-Street R.D.C. Twenty-eight old people's houses to be built in Cross St.

Chichester. Southdown Motor Services Ltd. are to erect a bus station and garage costing some £151,000. Architects are Clayton and Black and Partners, 10 Prince Albert St, Brighton.

Clitheroe T.C. Layout plans submitted for erection of 66 houses on Littlemore site.

Colne T.C. Revised plans in hand for erection of 36 flats on Rook St/Church Meadows site.

Coventry. A. H. Gardner and Partners, 11 Eaton Rd, are architects for erection of Christ Church at Cheylesmore.

Cuckfield (Sus) R.D.C. Erection of 48 houses at Ashenground Wood. R. J. Willett, surveyor, Council Offices, Oaklands, Haywards Heath.

Dublin. Tenders may soon be invited for erection of infants' school at Malahide.

Dudley. Factory in Birmingham Rd costing about £40,000 proposed by J. Gilliott and Sons Ltd.

Durham. Construction of 24 houses at Chester-le-Street, 4 at Jarrow, 5 at Seaham, and 12 at Consett for Police Authority. G. R. Clayton, Architect to P.A., Court Lane, Durham.

Glendale R.D.C. Layout plans to be prepared for 30 houses on Milfield estate.

Haverford T.C. Construction of 101 houses in City Rd estate. Borough Surveyor, Preton Hse.

Hexham. Police station to be built at cost of about £56,000.

Heywood (Lancs) T.C. Ninety-eight flats and 34 houses proposed on Hardfield site.

Horwich (Lancs). New headquarters and research establishment to be built in Chorley New Rd for J. W. Roberts Ltd., of Leeds. G. Alan Burnett, of 76 Albion St, Leeds, is architect.

Islington B.C. Erection of block of 15 dwellings at Tollington Park. Town Clerk, H. Dixon Clark, Islington Town Hall, Upper St, N.1.

Kidderminster T.C. First phase of slum clearance scheme in Broad St/York St area has been approved. Scheme includes demolition of 89 dwellings and erection of 51 houses and 8 old people's dwellings. Estimated cost £109,500.

Ludlow. Erection of factory being planned by T. E. Gorting of Anchor Works, Lr. Galdeford.

Maltby (Yorks) U.D.C. Approval given to erection of 40 houses and 20 flats on Cliff Hills estate.

Middlesbrough. Murray and Charleton Ltd., of Marton Rd, are to build offices, showrooms, garage and filling station. Also, J. Newhouse Ltd. propose to erect another storey at their Newport Rd departmental store.

Montrose (Angus). Dean of Guild Court has approved erection of showroom in Bridge St, for Archibald's Ltd.

Musselburgh T.C. Fifty houses to be built in centre of the town.

Newcastle-on-Tyne. Architects for Newcastle Breweries Ltd.'s £680,000 bottling factory in Hill St clearance area are J. Oswald and Sons, 68 Northumberland St.

Newtownards (Co. Down) T.C. Erection of 21 dwellings in Queen's Sq. Wyndham C. Scott, town clerk, Town Hall.

Newton Abbot U.D.C. Erection of block of 10 flats and 4 shops, 11 old people's bungalows, and 18 garages on Buckland estate. Surveyor, Cyril Lunn, 18 Devon Sq.

N. Ireland. W. T. Ashton and Sons Ltd. of Darwen, Lancs, have completed negotiations for erection of large textile factory at Fivemile Town in Co. Fermanagh.

North Tipperary (Eire). It is proposed to erect 140 dwellings in the Nanagh-Newport area at cost of about £145,700.

Northumberland. Erection of ambulance garage with offices, etc., at Wideopen. County Architect, County Hall, Newcastle.

Norwich. Norwich Union Insurance Societies to erect block of modern offices on site at 19 Upper King St.

Nottingham T.C. Erection of Highbank infants' school at Clifton. R. M. Finch, City Engineer and Surveyor.

Oxfordshire. Construction of county primary school at Yarnton, and additions to junior school, Kidlington. County Architect, Park End St Offices, Oxford.

Reading. Plans submitted by Firestone Tyre and Rubber Co., Ltd., for factory on Manor Farm site, have been approved by T.C.

Rutherglen (Lanark). Plans approved for primary school at Spittall. Cost estimated at £149,133.

Sacriston (Dur). Plans in hand for proposed cinema in Front St for Sacriston Memorial Inst. Architects are Eltringham and Lowes, Derwent St, Blackhill.

Scarborough T.C. Plans being prepared for erection of further 100 houses.

Smethwick T.C. Erection of total of 218 houses on Lyttleton Hall estate. Borough Engineer and Surveyor, Council Hse.

Stanley U.D.C. Construction of 20 houses at Bottom Boat. J. Hustwit, Engineer and Surveyor, Council Offices, Coach Rd, Outwood.

Stevenage. British Tabulating Machine Co., Ltd., of 17 Park Lane, London, W.1, are to occupy new factory in industrial area. D. P. Reay, Aston Hse, Stevenage, as architect.

St. Helens. Factory to be built on Parr estate for Sunnyside Stitching and Knitting Co., Ltd., of Gaskell St. Architects are Sir Alexander Gibb and Partners, Queen Anne's Lodge, London, S.W.1.

Stirling. Approval given to following schemes: erection of junior secondary school at Broombridge; primary schools at Whitecross and Stenhousemuir; junior secondary school at Grangemouth; reconstruction of Episcopal school; and extension of Raploch public school.

Stone (Staffs) R.D.C. Construction of 50 houses at Blythe Bridge. Hollins, Jones and Oldacre, architects, Lloyds Bank Chambers, Newcastle, Staffs.

Street (Som.) U.D.C. Approval sought for erection of 42 houses in Brooks St.

Stroud (Glos) U.D.C. Erection of 28 flats in seven blocks at Cashes Green. F. Foster Langley, engineer and surveyor, Council Chambers, High St.

Swindon. Sketch plans submitted for first stage in erection of new hospital estimated to cost £426,825.

Warrington (Lancs) R.D.C. Fifty houses to be built at Burtonwood.

West Hartlepool. Motor showrooms to be built in York and Park Rds for Ewart Parsons Ltd. Architects are Bell and Bell, Central Chambers, Whitby St.

Weymouth T.C. Plans in hand for 84 dwellings between Franchise and Chapelhay Sts.

Worksop (Notts) R.D.C. Layout plans approved for 52 houses at Harworth.

Overseas

Algeria. Comptoir d'Achat and Diffusion de Materiel Industriel et Agricole, 1 rue Sadi-Carnot, Algiers, are interested in agency prospects with U.K. manufacturers. Their range of interests includes pumps, central heating, accelerators and air conditioning, water softeners and windmill electric generators.

Salvador. Agencies from U.K. manufacturers of radio sets, washing machines, refrigerators, electric stoves, lamps and other appliances, sought by Almacen Liverpool, Calle Ruben Dario, 32 San Salvador. Write direct.

TRADE NOTES

Change of Address.—Owing to the expansion of business in the North and North West of England, the Manchester and North Midlands branch office of the John Thompson group of companies is moving to larger premises on 1 Oct. The new address will be: 6th Floor, Sunlight House, Quay Street, Manchester 3. Tel. No.: Deansgate 6151/2.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

Contemporary Lighting Engineers Ltd. Electricians, etc. Nom. cap.: £500. Dirs.: not named. Subs.: J. S. Hart, and Mrs. J. O. Hart, 34 Parkfield Rd, S. Harrow, Middlesex.

Radiomart Ltd., 71 Cricklade St, Cirencester, Glos. To take over business of seller and repairer of television, radio, electrical appliances and model aircraft toys carried on as "Radiomart" at Cirencester by Wm. R. Stephenson. Nom. cap.: £100. Dirs.: S. E. Trinder and Mrs D. E. F. Trinder, W. R. Stephenson and G. Holland.

Heating and Ventilation Services Ltd., Victoria Bridge, Stockton-on-Tees. Nom. cap.: £100. Dirs.: H. G. Wellingham, A. Akenhead, and K. Fawcett. Subs.: Jean Herbert and Claire Moore, 128 Albany St, N.W.

South Wales Concrete Pipe Co., Ltd., Lanelay Works, Pontycluh, Glam. Manufacturers of and dealers in centrifugally spun concrete pipes and concrete pipes of all kinds, concrete lighting columns and pylons, etc. Nom. cap.: £50,000. Dirs.: not named. Subs.: J. I. M. Garrett, 34 Stoke Rd, Taunton, Som., W. L. Addison, 6 Austin Friars, E.C.2.

Strother's Ltd. 8 Seaview Rd, Wallasey, Ches. Radio, television, electrical apparatus and appliances and musical instrument manufacturers and dealers, etc. Nom. cap.: £5,000. Dirs.: R. A. Strother, H. S. Strother and N. C. R. Fleming.

Glass to Metal Sealings Co., Ltd. Nassau Mill, Vine St, Patricroft, Lancs. Sealing of glass to metal and general engineering to the electronic trade, etc. Nom. cap.: £1,000. Dirs.: P. Sadler and Mrs L. Sadler, W. Aisbit and Mrs E. Aisbit.

D. Townsend and Co., Ltd. 51-3, Rochester St, Brighton. Electrical, radio, television and mechanical engineers and contractors, etc. Nom. cap.: £500. Dirs.: D. B. Townsend and E. Jeffery.

M.C.B. Co., (Manchester) Ltd. 6 Melrose Ave, Sale, Cheshire. Electrical engineers and manufacturers of electrical equipment and component parts, etc. Nom. cap.: £2,500. Dirs.: H. W. Wolff and Mrs A. D. Wolff.

New View Ltd. 9, Hanover St, Regent St, W.1. Manufacturers of and dealers in apparatus for projecting, receiving, transmitting, reproducing or recording sounds, pictures, etc. Nom. cap.: £2,500. V. Sheridan, address not stated, signs as director.

Trinity Electric Co., Ltd. 6 Soho St, Oxford St, W.1. Makers, repairers and hirers of and dealers in wireless and television sets, etc. Nom. cap.: £10,000. Permnt dirs.: O. Baron, F. Hays and W. H. Owen.

Non-Destructive Testers Ltd. Cricket Inn Rd, Sheffield, 2. Testing steel and other materials and flaw detection by means of supersonic, radiographic, magnetic and X-ray methods, etc. Nom. cap.: £1,000. Permt. dirs.: P. Fox, D. Gordon and M. L. Johnson.

A. S. Lowrey and Sons, Ltd. Electrical engineers and general electrical installation contractors, etc. Nom. cap.: £4,000. Dirs.: A. S. Lowrey, 146 Moorside North, and A. Lowrey, 137 Ovington Grove, Newcastle-on-Tyne.

Faraday House Engineering College, Ltd. Faraday Hse, 66 Southampton Row, W.C.1. Income and property of the College, whencesoever derived, shall be applied solely towards the promotion of its objects. Council: to be appointed by subs. Nom. cap.: £10,000. Subs.: J. O. Ince, Inholmes Park, Burgess Hill, Sussex, and F. A. Bell, Cunard Hse, 88 Leadenhall St, E.C.3.

San Marco (U.K.) Ltd., 2/3 Norfolk St, W.C.2. Dealers in and manufacturers of hotel, restaurant, cafe, canteen, hospital and household equipment, electrical and general engineers, etc. Nom. cap.: £100. Dirs.: To be appointed by subs. Subs.: K. de Vere Buckingham, Gainsborough Hse, Newbury, Berks, and R. D. Greig, 38 Dorchester Court, S.E.24.

C. A. Moreton Ltd., 94 Northgate St, Gt. Yarmouth. To take over business of wireless, television, electrical, motor and refrigeration engineer carried on as "C. A. Moreton" at Gt. Yarmouth. Nom. cap.: £500. Dirs.: C. A. Moreton, Mrs J. E. Moreton, and C. R. Moreton.

Morris and Ingram (Manufacturing) Ltd., 36/8, New Broad St, E.C.2. Light engineers, mechanical, electrical, hydraulic and general engineers, etc. Nom. cap.: £500. Dirs.: Mrs E. Ingram and Mrs J. M. Ingram-Wigdor, and S. R. Stammers.

Incorp. outside G.B. having established places of business within G.B.

Independent Merchandise Co. Pty. Ltd. Brit. add. Triumph Hse, 189 Regent St, W.1. Registered in Australia on June 5, 1953, as importers, exporters, refrigerators, shipowners, sheep farmers, stock owners and breeders, manufacturers of extract of meat, etc. Nom. cap.: £10,000. Name of person authorised to accept service: Elizabeth Frances Procter, Triumph Hse, 189 Regent St, W.1.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Invincible. 730,293. Class 11. Lighting installations and lighting fittings. Co-operative Wholesale Society Ltd, 1 Balloon St, Manchester.

"Jebko." 730,572. Class 7. Machines for washing and draining, drying, etc., all being electrically operated. J. E. Benghiat Ltd, 31/35 Beak St, W.1.

Morgan. 717,264. Class 7. Lifts, cranes, hoists, elevators, conveyors, all being electrically operated. 717,267. Class 12. Trucks and trolleys being hand operated. Albert Morgan and Co., 50 Wilkin St, N.W.5.

Rapid Mate. 730,034. Class 7. Machine tools, parts, and motors for machine tools. Adam and Harvey (Rapid Hammer) Ltd., 10/13 Newgate St., E.C.1.

Cueriser. 730,242. Class 9. Microphones, microphone stands, etc. Bishop Sound and Electrical Co., Ltd., 48 Monmouth St, W.C.2.

Lewcosol. 731,021. **Lewtinex** 731,022. Class 9. Insulated, fuse and resistance wire. London Electric Wire Co. and Smiths Ltd., 24 Qn Anne's Gate, S.W.1.

Permabit. 731,185. Class 9. Soldering irons. Light Soldering Developments Ltd., 30/32 Devonshire Rd, S.E.23.

Anchor. 731,551. Class 9. Radio and television sets. Anchor Investment Co., Ltd., 54 Bridge St, Manchester 3.

Maxicon. 729,947. Class 9. Plugs and sockets. Painton and Co., Ltd., Bembridge Drive, Kingsthorpe, Northampton.

Armourlumin. 722,214. Class 9. Electric cooking utensils. Great Universal Stores, Ltd, Devonshire St, Ardwick, Manchester 12.

MEETINGS TO NOTE

THURSDAY, 9 SEPT.

INCORP. PLANT ENGRS. (N. East). "Engineering Application of Electro-deposited Metals." J. W. Oswald, Roadway Hse, Oxford St, Newcastle, 7 p.m.

SATURDAY, 11 SEPT.

I.E.E. (N. of Scotland sub-area). Summer meeting at Dundee.

WEST COUNTRY INTERNATIONAL FAIR at Bristol. Open until 25 Sept.

MONDAY, 13 SEPT.

INCORP. PLANT ENGRS. (Dundee). "Manufacture of Ball and Roller Bearings." W. N. Mills, Mathers Hotel, 7.30 p.m.

A.S.E.E. (Bolton). "Transformer and Switch Oil." G. Scott. Balmoral Hotel, Bradshawgate, 7.30 p.m.

A.S.E.E. (Central London). Film show—U.S. Information Service. St. Ermin's Hotel, Caxton St, S.W.1, 7 p.m.

LEICESTER ELECTRICAL SOC. "Rock Propulsion and Interplanetary Travel." D. Hurden. Elect. Board Offices, Charles St, 7 p.m.

BIRMINGHAM ELECTRIC CLUB. Presidential address by H. M. Fricke. Grand Hotel, Colmore Row, 6.15 p.m.

TUESDAY, 14 SEPT.

ELECT. INDUSTRIES CLUB. Monthly Luncheon.

INSTN. OF HEATING AND VENTILATING ENGRS. (London). "Current American Practice in Heating, Ventilating and Air Conditioning." John K. M. Pryke.

WEDNESDAY, 15 SEPT.

INCORP. PLANT ENGRS. (Glasgow). "Compressed Air in Industry." H. Burnett. Building Centre, 425 Sauchiehall St, 7 p.m.

INCORP. PLANT ENGRS. (Kent). "Causes and Prevention of Steam Plant Scale." W. F. Gerrard. Bull Hotel, Rochester, 7 p.m.

INCORP. PLANT ENGRS. (Western). "Planning and Reconstruction of Bristol." R. W. Jefford. Grand Hotel, Bristol, 7.15 p.m.

SUSSEX INDUSTRIES FAIR. 8th annual show at Corn Exchange, Brighton. Closes on 25 Sept.

A.S.E.E. (Manchester). "Applications and Characteristics of Induction Motors." F. T. Bartho. Engineers' Club, Albert Sq, 7.30 p.m.

A.S.E.E. (Nottingham). Chairman's address at Electricity Board Showrooms, Smithy Row, 7.30 p.m.

A.S.E.E. (S.W. London). "Industrial Space Heating." C. S. Whitby. Guild Hse, Worple Rd, Wimbledon, 8.15 p.m.

THURSDAY, 16 SEPT.

INCORP. PLANT ENGRS. (Blackburn). "Management." Golden Lion Hotel, 7.30 p.m.

INCORP. PLANT ENGRS. (Merseyside). "Repair of Cracked Castings." N. Tinwell. Chester.

A.S.E.E. (Watford). "Power Factor Correction." F. T. Bartho. Clarendon Hotel, Station Rd, 8 p.m.

A.S.E.E. (Kent). "Cathode-ray Picture Tubes." H. J. Beach. Sun Hotel, Chatham, 8 p.m.

Photograph by courtesy of GILLETTE Industries – one of many famous users of HENLEY METALLIC FLEXIBLE ARMOURED CABLES.

machine wiring made easy

For starter-to-motor wiring, for drop leads from overhead trunking, and for connections to portable appliances, HENLEY Metallic Flexible Armoured Cables and Cords have proved ideal for over twenty years.

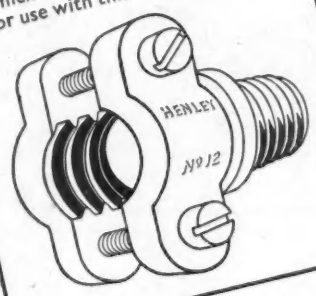
This flexible semi-interlocking armouring provides a barrier resistant to moisture and oil and ensures ample mechanical protection.

Connections are extremely simple, the ends are trimmed quickly with ordinary tools and the armouring will not unravel.

Please write for Publication 493.

ADJUSTABLE GRIP GLAND
(non-moisture proof)

Use only HENLEY GLANDS which are designed specially for use with this class of cable



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METALLIC FLEXIBLE ARMOURED CABLES

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS TO THE LATE KING GEORGE VI

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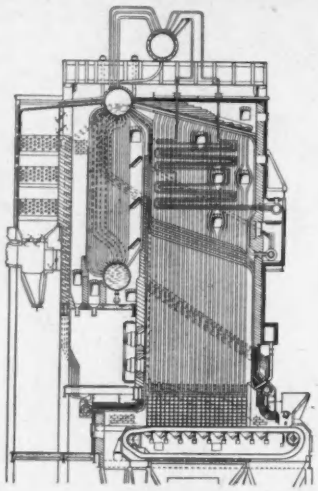
STEAM GENERATION-



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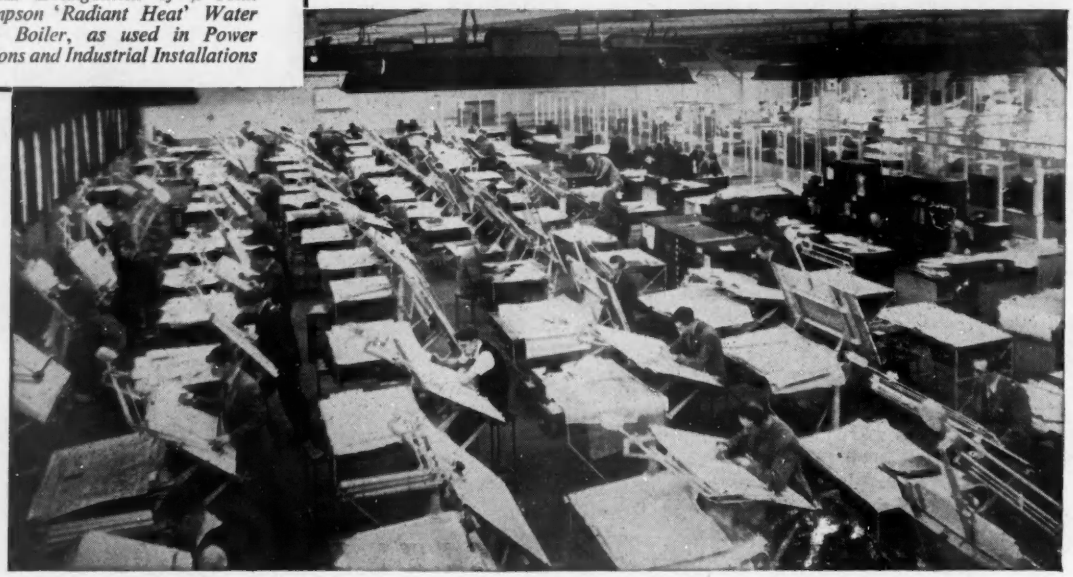
The Water Tube Boiler

The modern Water Tube Boiler is a large steam generating unit providing immense quantities of steam at high pressure and high temperatures as power for the turbo-electric machines in Power Stations. The design and construction of a complete Water Tube Boiler installation requires much engineering skill to put together the multitude of component parts. Below is a portion of our Drawing Office where we build the entire job on paper to ensure accurate interlocking of hundreds of different parts, which include many actual miles of steel tubes and hundreds of tons of steel in various forms.



Please address enquiries, and requests for illustrated literature to:—

JOHN THOMPSON WATER TUBE BOILERS LIMITED

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WOLVERHAMPTON

CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

BOROUGH OF WEMBLEY

CONVERSION OF STREET LIGHTING FROM GAS TO SODIUM VAPOUR DISCHARGE LIGHTING

TENDERS, which must be received not later than noon on Wednesday, 22 Sept., 1954, are invited for the above work which comprises the dismantling of Gas Lamps and the erection of 471 No. 45 and 60 W G.E.C. Sodium Vapour Discharge Lamps.

Form of Tender, Bill of Quantities and Specification may be obtained from the Borough Treasurer, Town Hall, Wembley, upon deposit of Two Guineas which will be refunded if a bona fide tender is submitted with all documents intact.

Conditions of Contract and drawings may be inspected at the office of the Borough Engineer and Surveyor. (N 77)

BOROUGH OF BRENTFORD AND CHISWICK

TENDERS are invited for the electric wiring of 146 Houses on the Ealing Rd Estate, Brentford. Specification and Form of Tender can be obtained on application to the Borough Engineer, Town Hall, Chiswick, on payment of a deposit of four guineas, which will be refunded on receipt of a bona fide tender.

Tenders in a plain sealed envelope bearing no indication of the name of the sender and endorsed "Tender for Electric Wiring, Ealing Road Estate," addressed to the undersigned must be received not later than 12 noon on Monday, 20 Sept.

W. F. J. CHURCH,
Town Clerk.

27 Aug., 1954. (N 36)

LANCASHIRE COUNTY COUNCIL

APPLICATIONS are invited for the supply of the following ELECTRICAL AND OTHER EQUIPMENT TO THE LANCASHIRE COUNTY COUNCIL. The successful firms will be required to deliver to County premises in both large and small quantities, and the contracts will be on an annual basis:

(*a*) Immersion Heaters.
(*b*) Water Heaters.
(*c*) Sewing Machines.
(*d*) Pottery Kilns.
(*e*) Technical Drawing Equipment.
(*f*) Experimental Power Units.
(*g*) Vacuum Cleaners.
(*h*) Food Mixing Machines.
(*i*) Electric Fires.
(*j*) Radio Sets.
(*k*) Stage Equipment.
(*l*) Washing Machines.
(*m*) Woodwork and Metalwork Tools and Machinery.
(*n*) Refrigerators.
(*o*) Schools Broadcast Equipment.
(*p*) Electric Kettles.
(*q*) Electric Drying Cabinets.
(*r*) Electric Hair Dryers.
(*s*) Electric Floor Scrubbers and Polishers.
(*t*) Electric Irons.
(*u*) Electric Cookers.
(*v*) Mechanical Clocks.

continued in next column

continued from previous column

(*w*) Electric Clocks.
(*x*) Electric Lamps.
(*y*) Fluorescent Tubes.
(*z*) Electric Wash Boilers.

If any further electrical items are required, firms to tender will be drawn from a list of those replying to this advertisement.

Firms wishing to tender should make application to the County Architect, County Hall, Preston, not later than 20 Sept., 1954, indicating for which item, or items, they wish to quote. (N 37)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18–64, *or a woman aged* 18–59; *unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order,* 1952.

WEST MIDLANDS GAS BOARD
Warwickshire Division

MECHANICAL AND ELECTRICAL ENGINEER
FOLESHILL GAS WORKS, COVENTRY

APPLICATIONS are invited from suitably qualified persons for the above post.

Candidates should have had extensive practical experience of the installation and maintenance of mechanical and electrical plant and equipment. Experience of gasworks practice would be an advantage.

Accommodation will be available at a reasonable rental.

The commencing salary will not be less than £1,000 per annum.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6 Augustus Rd, Edgbaston, Birmingham 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.
(N 33)

NORTH WESTERN GAS BOARD
Liverpool Group

SENIOR INSTRUMENT ENGINEER

APPLICATIONS are invited for the above pensionable appointment, at the Central Laboratory, Wavertree Works, Liverpool, at a salary within Grades A.P.T. 11 or 12 (£715/£840 or £765/£890 per annum) according to qualifications and experience.

Applicants should possess suitable technical qualifications in physics or electrical or mechanical engineering, minimum standard Higher National Certificate, and should have a wide experience of installation, maintenance and calibration of all types of industrial instruments. Ability to supervise an Instrument Section covering all the works in the Group is essential.

Apply by letter to the Chief Personnel Officer, North Western Gas Board (Liverpool Group), Radiant Hse, Bold St, Liverpool, within 14 days. (N 94)

BRITISH ELECTRICITY AUTHORITY
South East Scotland Division

SENIOR ASSISTANT ENGINEER
GENERATION (OPERATION) DEPARTMENT

SENIOR ASSISTANT ENGINEER required in Generation (Operation) Department at Divisional Headquarters, Portobello.

Candidates must have highest technical qualifications in electrical and/or mechanical engineering, and should preferably have a first-class degree or equivalent in electrical or mechanical engineering, together with Corporate Membership of the Institute of Electrical and/or Mechanical Engineers, and some experience in the design, operation and maintenance of steam electric power stations.

Salary £970/£1,134 (N.J.B. class AX/BX, Grade 1). Appointment superannuable.

Applications on form AE.6/ACT, obtainable from Divisional Controller, British Electricity Hse, Portobello, Midlothian, should be completed and returned by 25 Sept., 1954. (N 92)

YORKSHIRE ELECTRICITY BOARD
No. 3 (Sheffield) Sub-Area

Sheffield South District
SECOND ASSISTANT DISTRICT ENGINEER

APPLICANTS must have technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers with training and experience fitting them to take charge of substation and mains construction, operation and maintenance work in a heavy industrial and densely developed residential area surrounded by a rural area in which are 33 kV and L.V. underground and overhead systems of electricity mains. The successful candidate will be expected to take personal charge of the more responsible construction and maintenance work on the 11 kV and L.V. systems in the district.

Salary—N.J.B. Class H, Grade 7, £772/£802 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial St, Sheffield, not later than 23 Sept., 1954.

No. 4 (Leeds) Sub-Area

JOINTERS (E.H.T.)

Applicants must be first class craftsmen and have experience in all types of joints and boxes on L.V., 6·6 kV and 11 kV systems. Experience on 33 kV joints and terminations will be an additional advantage.

Rate of pay 3s. 9d. per hour and conditions in accordance with the N.J.I.C. Agreement.

Applications stating age, and giving full details of experience, should be forwarded to the Manager, No. 4 (Leeds), Sub-Area, Yorkshire Electricity Board, Bramhope, Leeds, not later than 17 Sept., 1954.

No. 1 (Bradford) Sub-Area

Keighley District
CONSUMERS ENGINEER

Applicants should be Corporate Members of the Institution of Electrical Engineers or hold qualifications leading to such membership, and must have had a sound training with subsequent experience in the work of a Consumers' Department in an Electricity Undertaking.

Details should be given of experience in the following matters:

Negotiations with consumers requiring electricity supplies, tariffs, sales development, application of I.E.E. Wiring Regulations and other relevant regulations in testing and inspecting consumers' installations, electrical installation work, including preparation of specifications and tenders, repair to electrical apparatus, control of staff and workpeople.

Salary—N.J.B. Class E, Grade 8, £619/£629 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford, not later than 23 Sept., 1954. (N 61)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following vacancies:

3RD ASSISTANT ENGINEER (CONSTRUCTION) Chilterns Sub-Area Headquarters. Bedford 137/54.N.

Candidates should have had experience in the construction of substations, the erection of overhead lines, the laying and jointing of underground cables at voltages up to 33 kV, and wayleave negotiations.

Salary in accordance with Class L, Grade 11 of the National Joint Board Salary Agreement commencing at £717.

Apply to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend St, Bedford.

(i) 3RD ASSISTANT ENGINEER
(ii) JUNIOR ENGINEER
Bedford District, Chilterns Sub-Area
134/54.R.

Candidates for (i) should have had a sound technical training and suitable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground systems, including substations. For (ii) they should have had a sound general and technical education and should possess the Higher National Certificate or equivalent qualification. Some experience of H.V. and L.V. distribution systems is desirable.

Salaries will be in accordance with Class F of the National Joint Board Salary Agreement as follows:

(i) Grade 9 commencing at £607.
(ii) Grade 14 at £466.

Apply to the District Manager, Eastern Electricity Board, Prebend St. Bedford.

GENERAL ASSISTANT ENGINEERS

Required in the following localities:

(1) Bedford District, Chilterns Sub-Area. 134/54.R.
(2) Aylesbury District, Chilterns Sub-Area. 135/54.R.
(3) King's Lynn District, Norfolk Sub-Area. 138/54.R.

Candidates should have had a sound technical training and suitable experience in the construction, operation and maintenance of underground and overhead systems, including substations.

Salary in accordance with Grade 11 of the National Joint Board Salary Agreement as follows:

(1) Class F, commencing at £548.
(2) and (3) Class E, commencing at £524.

Apply as follows:

(1) District Manager, Eastern Electricity Board, Prebend St, Bedford.
(2) District Manager, Eastern Electricity Board, Exchange St, Aylesbury, Bucks.
(3) District Manager, Eastern Electricity Board, Gaywood Bridge Offices, Wootton Rd, King's Lynn, Norfolk.

Future salaries and conditions of service for all these appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, by letter, stating age, education, qualifications and experience with details of present appointment and salary should be submitted to the Manager concerned within fourteen days of the appearance of this advertisement. (N 82)

BRITISH ELECTRICITY AUTHORITY
North West, Merseyside and N. Wales Division

VACANCY No. 162/54/T—ASSISTANT SHIFT CHARGE ENGINEER, Agecroft "B" Generating Station, near Manchester. Salary £641/£667 (G.9). Closing date 16 Sept.

Vacancy No. 164/54/T — SHIFT CHARGE ENGINEER, Radcliffe Generating Station, Lancs. Salary £697/£718 (F.7). Closing date 18 Sept.

Vacancy No. 165/54/T — SHIFT CHARGE ENGINEER, Roosecote Generating Station, Barrow. Salary £729/£758 (G.7). Closing date 18 Sept.

Applications to Controller, British Electricity House, 825 Wilmslow Rd, Manchester 20, quoting Vacancy No. (N 71)

BRITISH ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following appointment in the Transmission Department at Divisional Headquarters:

SECOND ASSISTANT ENGINEER (Civil and Mechanical). Salary N.J.B. Class AX/DX,, Grade 2, £834/£1,053 per annum (plus London Weighting).

Preference will be given to applicants who hold a University Degree in Engineering or who are Corporate Members of one of the Institutions of Civil, Electrical, Mechanical or Structural Engineers or who possess equivalent qualifications.

They should have had experience in the design and construction of overhead electrical power lines erected on steel towers, site works for electrical substations, foundations for heavy plant and brick buildings. They should also be familiar with the preparation and interpretation of specifications and bills of quantities and should have supervised contracts for the above works.

The commencing salary will depend upon experience and qualifications, but will be within the above range.

Forms of Application may be obtained from the Authority's Headquarters or from any Divisional Office of the Authority, and should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by 18 Sept., 1954.

W. N. C. CLINCH,
Controller.
(N 32)

LONDON ELECTRICITY BOARD

ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the above position in the Western Sub-Area Drawing Office in Central London.

Candidates should have a good general and technical education with experience of tracing, lettering, isometric and freehand drawings.

The post is graded under Schedule "D" of the National Joint Board agreement as Grade 6—£458/£595. 7s. per annum, inclusive of London Allowance.

Application forms obtainable from Personnel Officer, 46 New Broad St, E.C.2, to be returned completed by 18 Sept., 1954. Please enclose addressed envelope and quote ref: V/1810/T. (N 89)

STATION ENGINEERS AND STATION ENGINEERS (MECH.)

required by Air Ministry at R.A.F. and M.C.A. stations. Qualifications and experience required: (a) Ordinary National Certificate in either Electrical or Mechanical Engineering as appropriate or equivalent standard of technical education. (b) Recognised apprenticeship in either electrical and/or mechanical engineering. (c) Three years' responsible engineering employment preferably on operation and maintenance of mine, factory or workshop plant and services. Supervisory experience an advantage as duties entirely supervisory and cover installation, operation and maintenance of high and medium voltage distribution system, internal electrical installations, diesel and boiler house plant, steam and hot water heating systems and other miscellaneous installations, tools and equipment. In the case of Station Engineers (MECH.) duties are of more specialist nature and cover mechanical items only. Commencing salary according to age, qualifications and experience (normally £550 at age 28 or over), on the range £510/640. Appointments include liability for service overseas for which special allowance payable in addition to higher salary. Appointments non-pensionable. Only natural-born British subjects. Write, giving date of birth, education, full details of qualifications and experience of posts held (including dates) to E.A.1564/AB, Appointments Officer, Ministry of Labour and National Service, 1-6 Tavistock Sq, W.C.1, by 30 Sept., 1954. No original testimonials should be sent. Only candidates selected for interview will be advised. (N 90)

AIR MINISTRY

require MECHANICAL AND ELECTRICAL ENGINEERS in Works Department for design, operation and maintenance of mechanical and electrical services on R.A.F. stations at home and overseas and Civil Aviation stations. Appointments in two grades (*a*) Main Grade, salary scale £1,000/£1,320 (*b*) Assistant Grade £650/£1,000. Starting pay according to qualifications and experience. Salaries somewhat lower in provinces. Candidates should be age 25 or over. Appointments temporary and non-pensionable but with long term possibilities. Special Allowance up to £1,500 a year according to location payable in addition to salary during overseas service. Candidates must be natural born British subjects of natural born British parents.

Minimum qualifications and experience for both grades of posts:

(i) (*a*) University degree or equivalent diploma in electrical and/or mechanical engineering and at least a two year apprenticeship or (*b*) Graduate or Corporate Membership of the Institutions of Mechanical or Electrical Engineers with appreciable electrical engineering experience and at least three years' apprenticeship and (ii) employment in responsible position for minimum of three years with well established engineering concern providing wide experience in electrical and mechanical engineering practice.

Application forms quoting reference D1/54A from M.L. and N.S., Technical and Scientific Register (K), Almack House, King St, London, S.W.1. (N 74)

NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments subject to N.J.B. Agreement for Electricity Supply Industry:

Area Board Headquarters

GENERAL ASSISTANT ENGINEER, Chief Engineer's Department, Meters Section, Ellison Place Testing Station, Newcastle-upon-Tyne. Applicants should hold Higher National Certificate in electrical engineering or equivalent qualification. Salary Schedule "C," Grade 8, £501/£694.

Tyne Sub-Area

JUNIOR ENGINEERS at Sub-Area Headquarters, Newcastle-upon-Tyne. Applicants should hold Higher National Certificate in electrical engineering or equivalent qualification and have had suitable practical experience. Salary Schedule "A," Class L, £451/£547. Starting salary will depend on qualifications and experience.

Harrogate Sub-Area

Thirsk District

SECOND ASSISTANT DISTRICT ENGINEER with location at Bedale. Salary Schedule "A," Class C, Grade 7, £599/£622. Applications stating age, qualifications and experience should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol Hse, Newcastle-upon-Tyne, within ten days of the appearance of this advertisement. (N 91)

BRITISH ELECTRICITY AUTHORITY
South Western Division

TECHNICAL STAFF VACANCIES

(*a*) SHIFT CHARGE ENGINEER—Plymouth "B" Generation Station, N.J.B. G.7, £729/£758.

(*b*) STATION SHIFT CONTROL ENGINEERS (2)—East Yelland Generating Station, N.J.B., G.10, £608/£530.

Superannuation Scheme.

Candidates for (*a*) should have had considerable experience in a modern generating station. Graduate or Corporate Membership of a recognised Engineering Institution or equivalent, desirable.

For (*b*) should possess good technical qualifications, and have had training and experience in the control and operation of steam generating plant and main switchgear

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 20 Sept., 1954. (N 60)

AUCKLAND UNIVERSITY COLLEGE
University of New Zealand

APPLICATIONS are invited for a LECTURESHIP IN ELECTRICAL ENGINEERING.

Candidates should be graduates in Electrical Engineering. Experience in electrical measurements, transmission and distribution of electricity, or high frequency or line communication will be an advantage.

The salary scale for the position is from £800 to £950 per annum plus a recent general increase of £92. 8s. per annum. Three annual increments of £50 are payable under this scale.

The successful applicant will be expected to take up his duties as soon as possible after appointment.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 5 Gordon Square, London, W.C.1.

The closing date for the receipt of applications, in New Zealand and London, is 15 Oct., 1954. (N 30)

IMPERIAL COLLEGE

APPLICATIONS are invited for LECTURER in Electrical Engineering. Salary scale £600 x £50—£900 x £50—£1,150. F.S.S.U. and Family Allowances. Candidates should possess a good honours degree in electrical engineering and preferably have completed a Graduate Apprenticeship. Initial salary, according to experience and qualifications, will be at the lower end of the scale.

Applications, stating age, academic qualifications and experience, together with the names of two referees, should reach the Head of the Electrical Engineering Department, City and Guilds College, S.W.7, not later than 1 Oct., 1954. (N 58)

BRITISH ELECTRICITY AUTHORITY
South Wales Division

APPLICATIONS invited for superannuable N.J.B. appointments at Divisional Headquarters, as follows:

Vacancy No. 89/54
GENERATION (CONSTRUCTION) DEPARTMENT

1. SECOND ASSISTANT ENGINEERS AX/CX2, £834/£1,025.

Applicants should preferably be Corporate Members of the Institution of Mechanical and/or Electrical Engineers, or exempted from the appropriate examination, and have experience in Power Station construction; be able to make investigations and prepare schemes and specifications for new projects.

2. THIRD ASSISTANT ENGINEERS AX/CX5, £649/£835.

Applicants must possess H.N.C. or equivalent. Required to assist 2nd Assistant Engineers as above.

3. GENERAL ASSISTANT ENGINEERS AX/CX8, £501/£675.

Applicants should have a knowledge of mechanical or electrical practice in Power Stations. H.N.C. or equivalent desirable.

Vacancy No. 90/54
DIVISIONAL TECHNICAL DEPARTMENT

GENERAL ASSISTANT ENGINEER AX/CX8, £501/£675.

Candidates should possess a degree or H.N.C. in Electrical Engineering; some experience in the manufacture, design or erection of high voltage transmission equipment desirable. Required to assist in the design of a 132 kV transmission system and in the investigation of a wide range of system problems, including fault calculations and load flow studies.

Vacancy No. 92/54
GENERATION (OPERATION) DEPARTMENT

GENERAL ASSISTANT ENGINEER (Efficiency, Testing and Combustion) AX/CX8, £501/£675.

Applicants should possess H.N.C. Experience in the operation and efficient control of high pressure steam plant desirable.

Application forms obtainable from Secretary, South Wales Division, British Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 24 Sept., 1954. (N 83)

BRITISH ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following positions:

S/13.563

GENERAL ASSISTANT ENGINEERS (CIVIL) GENERATION CONSTRUCTION DEPARTMENT, DIVISIONAL HEADQUARTERS, PORTSMOUTH

Applicants should have had a sound technical training and some experience in heavy civil engineering work, preferably in the construction of large power stations, or in one or other of the following:

(*a*) Piled and reinforced concrete foundations.
(*b*) Wharves and jetties, or tunnelling.
(*c*) Steel frame and reinforced concrete buildings.
(*d*) Land and hydrographical surveying.

Applicants should possess qualifications leading to corporate membership of the Institute of Civil Engineering. The successful candidate will be engaged on works suitable for submission for Part C of the Institute's Examination. Facilities for further study are available at the Portsmouth College of Technology.

Salary: N.J.B. AX/CX 8, £501/£675.

S/13.564

ASSISTANT ENGINEER (EFFICIENCY) SOUTHAMPTON GENERATING STATION

Applicants must have had a sound technical training, should possess qualifications leading to corporate membership of an appropriate professional institution, and should have experience in the operation of a modern generating station. Preference will be given to candidates with a knowledge of the work of an efficiency department.

Salary: N.J.B. F/9, £607/£629.

Special application forms obtainable from the Divisional Secretary, 111 High St, Portsmouth, should be returned by 22 Sept., 1954. (N 76)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
Aberdeen Area

APPLICATIONS are invited for the post of MAINTENANCE ENGINEER (ELECTRICAL) in the Board's Aberdeen Power Station, from qualified engineers with good practical experience of power station equipment, transformers and switchgear for 132/33/6·6 kV and the associated protection and control of power systems.

Salary will be in accordance with N.J.B. Agreement, Class F, Grade 6. The position is superannuable.

Applications should reach the undersigned by 18 Sept., 1954, giving personal details, experience and technical qualifications and should state period of notice required before appointment could be taken up.

J. E. WHITTAKER,
Area Manager.
Area Offices,
Millburn St, Aberdeen. (N 57)

BRITISH ELECTRICITY AUTHORITY
Midlands Division

APPLICATIONS are invited for the following positions in the Generation (Operation) Department. N.J.B. service conditions, superannuable appointments, salaries within Schedule "A" of the Agreement:

(a) ASSISTANT SHIFT CHARGE ENGINEER at Ironbridge Power Station, Grade H9, commencing at £680 per annum.
(Vacancy No. 752MD)

(b) BOILER HOUSE SHIFT CHARGE ENGINEFR at Nechells "A" Power Station, Grade F9, commencing at £607 per annum.
(Vacancy No. 753MD)

Applicants for these positions should have received a sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear, including for (b) a knowledge of pulverised fuel firing. Appropriate qualifications an advantage.

Apply, quoting the vacancy number, on form AE6, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 25 Sept., 1954. (N 86)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

THIRD ASSISTANT ENGINEER (PLANNING) SHROPSHIRE AND HEREFORDSHIRE SUB-AREA HEADQUARTERS

Applicants should have had experience in planning extensions of E.H.T. Substations, transmission and distribution systems. Technical qualifications desirable. Salary £641/£667 per annum (N.J.B. Class "G," Grade 9). Apply, in writing, within 14 days stating age, experience, present salary and position to Mr W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER
STONE DISTRICT, NORTH STAFFORDSHIRE SUB-AREA

Applicants should have had a sound technical training and experience in the preparation of wiring schemes and estimates for domestic, farm and industrial installations. Duties will include advice to consumers on supply matters and sales of domestic and farm equipment. Technical qualifications desirable. Salary £592/£610 per annum (N.J.B. Class "D," Grade 8). Apply, in writing, within 10 days stating age, experience, present salary and position to District Manager, Midlands Electricity Board, High St, Stone, Staffs.

A. STEPHENS.
Secretary.
(N 84)

BRITISH ELECTRICITY AUTHORITY
London Division

THIRD ASSISTANT ENGINEER DEPARTMENT OF CHIEF GENERATION ENGINEER (O)

Vacancy No. 54/747

APPLICANTS should possess a good general and technical education to the standard required for Corporate Membership of the I.E.E. or the I.Mech.E. and should have some experience of Generating Station operation.

Clarity of expression and ability to compile concise and readable reports also essential qualifications. Successful candidate will be required to prepare technical reports, to edit fault reports, and to assist in the preparation and progressing of plant overhaul programmes.

Conditions of service and salary in accordance with N.J.B. Agreement, Schedule C, Class AX/EX, Grade 5=£681. 9s./£927. 3s. p.a. including London Allowance.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity Authority, London Division, P.O. Box No. 136, Generation House, Great Portland St, W.1, and be received within 14 days of this advertisement. (N 75)

MIDLANDS ELECTRICITY BOARD

APPOINTMENT OF ASSISTANT CHIEF ENGINEER—DISTRIBUTION

APPLICATIONS are invited for the position of Assistant Chief Engineer (Distribution) in the Engineering Department at Board Headquarters, Mucklow Hill, Halesowen, which will become vacant on 1 Dec.

Applicants should have had considerable experience in the design, construction, operation and maintenance of Overhead Line and Underground Cable Systems and Substations, together with their associated equipment at voltages up to and including 66 kV. Experience of 132 kV is desirable but not essential. Experience in operation and maintenance of a fleet of transport vehicles is also desirable.

Appropriate technical qualifications will be considered an advantage.

Salary will be N.J.M. Scale 4 (£1,600/£1,750 per annum).

Applications, stating age, experience and qualifications, should be made within 14 days to: The Secretary (Ref. FWC), Midlands Electricity Board, Board Headquarters, Mucklow Hill, Halesowen, near Birmingham.

A. STEPHENS,
Secretary.
(N 85)

BRITISH ELECTRICITY AUTHORITY
South East Scotland Division

require SHIFT CHARGE ENGINEER for Dunfermline Power Station.

Applicants should preferably have experience in operation of turbo-generators, water tube boilers and h.t. electrical plant. A knowledge of alternating current is advisable. Certificated marine engineers would be considered.

Salary £599/£622 (N.J.B. Class C/7). Pension scheme.

Apply in writing by 25 Sept., 1954, stating age and experience to Divisional Controller, British Electricity House, Portobello, Midlothian. (N 31)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
Aberdeen Area

THERE will shortly occur 5 vacancies for STATION SHIFT CONTROL ENGINEERS. N.J.B. Grade (£577/£598) F/10. Applicants should have control experience and preferably hold a Higher National Certificate. Applications should be made within 14 days on a form to be obtained from me. The position is superannuable.

J. E. WHITTAKER,
Millburn St, Area Manager.
Aberdeen. (N 87)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT SECTION ENGINEER (OPERATION) required in the No. 4 Sub-Area, based at Crewe.

Salary £587/£600 per annum (N.J.B. E/9). The appointment is superannuable and subject to medical examination.

Applicants should have experience with E.H.T., H.T. and L.T. overhead and underground distribution work, and preferably have the technical qualifications to enable them to become Chartered Electrical Engineers.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham. Closing date: 20 Sept., 1954. (N 56)

BRITISH ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following posts:

JUNIOR ENGINEER
PETERBOROUGH GENERATING STATION

Salary: Class F, Grade 15, £402—Grade 14, £466 per annum.

Commencing salary depending upon qualifications and experience.

The duties of the successful applicant will include assisting in the Control Room on shift and other operation and investigation duties. Preference will be given to applicants who have had previous experience in a Generating Station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Applications, stating age, qualifications and experience, should be sent to the Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by 18 Sept., 1954.

W. N. C. CLINCH,
Controller.
(N 35)

NORTH WESTERN GAS BOARD
North Cheshire Group

ELECTRICAL SUPERINTENDENT—DENTON NEW WORKS

APPLICATIONS are invited for the above pensionable appointment at a salary within Grade A.P.T. 9 (£635/£735 per annum).

Applicants should have experience in the operation and maintenance of electrical equipment on a gas works, including 1,200 KW turbo-alternators, 6·6 kV, 3·3 kV and 440 V distribution systems, electric motors and starters up to 500 h.p.

Detailed applications, giving the names of two referees, should reach the General Manager, North Western Gas Board (North Cheshire Group), Gas Works, Portwood, Stockport, within fourteen days. (N 34)

STAFFORDSHIRE COUNTY COUNCIL
Education Committee

APPLICATIONS are invited for ELECTRICAL ENGINEERING ASSISTANTS within the salary Grade A.P,T, I to IV (£490/£625 per annum).

Applicants should have passed Part I of the I.E.E. Associate Membership Examination or hold equivalent qualifications.

Form of Application and further particulars can be obtained from: The County Education Architect, Green Hall, Lichfield Rd, Stafford, and should be returned within 10 days of this advertisement. (N 59)

SOUTHERN ELECTRICITY BOARD

PLANNING ENGINEER

BASINGSTOKE District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class D, Grade 7 (£633/£638/£643 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist in the preparing of Schemes and Estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks and substations of all types operating at voltages up to 33,000 V.

Applicants should possess technical qualifications up to A.M.I.E.E. standard.

The successful candidate for the above appointment will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed not later than 24 Sept., 1954. (N 80)

BRITISH ELECTRICITY AUTHORITY
East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

DRAUGHTSMAN,
TRANSMISSION DEPARTMENT,
DIVISIONAL HEADQUARTERS
Vacancy No. 140/54/ET

A Draughtsman is required in the Transmission Department at this Divisional Headquarters. Experience on the design and construction of H.V. Substations or overhead transmission lines an advantage.

Salary in accordance with Schedule D of the National Joint Board Agreement. Grade 6 (£433/£567 per annum) for Engineering Draughtsman or Grade 5 (£567/£671 per annum) for Senior Draughtsman, according to experience and ability.

Closing date for receipt of applications 21 Sept., 1954.

GENERAL ASSISTANT ENGINEER,
TECHNICAL DEPARTMENT,
DIVISIONAL HEADQUARTERS
Vacancy No. 139/54/ET

The minimum technical qualification required is the Higher National Certificate in Electrical Engineering. Preference will be given to candidates who have completed a recognised post graduate apprenticeship and experience of High Voltage switchgear and protective gear will be an advantage.

The successful candidate will be required to reside in or near Leicester.

The salary will be in accordance with Schedule C, Class AX/DX, Grade 8 (£501/£694 per annum) of the National Joint Board Agreement. The commencing salary will depend on qualifications and experience.

Closing date for receipt of applications 21 Sept., 1954.

ASSISTANT MAINTENANCE ENGINEER (ELECTRICAL)
COVENTRY POWER STATION
Vacancy No. 141/54/ET

Applicants should have received a thorough technical and practical training with experience in testing protective gear, maintenance of alternators, transformers, switchgear and associated equipment.

Preference will be given to candidates who are associated members of a recognised Institution or possess similar qualifications.

Salary will be in accordance with Class G, Grade 8 (£678/£704 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 28 Sept., 1954.

ASSISTANT SHIFT CHARGE ENGINEER
NORTHAMPTON POWER STATION
Vacancy No. 142/54/ET

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Applicants should have had a sound technical training and be experienced in the operation of modern steam power stations. They should preferably hold a Higher National Certificate in Electrical or Mechanical Engineering.

The salary for the appointment will be in accordance with Class G, Grade 9 (£641/£667 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 28 Sept., 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy No.

L. F. JEFFREY,
Divisional Controller.
3 Sept., 1954. (N 81)

SOUTH WESTERN ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT ENGINEER, Torbay. Salary N.J.B. Class F, Grade 7—£697/£718 p.a.

Duties include supervision of construction of overhead lines and substations, and the laying and jointing of underground mains, on H.V. and M.V. distribution systems up to 33 kV, throughout the District. Field experience of construction work essential, and knowledge of building construction and graduate membership of the I.E.E. are desirable.

Applications on forms obtainable from District Manager, Electric Hse, Union St, Torquay, to be returned by 24 Sept., 1954. (N 93)

SOUTH EASTERN ELECTRICITY BOARD

ELECTRICIAN (Contracting Dept.)—Croydon District.

Wages 4s. 2½d. per hour for 44-hour week. Applicants must be fully experienced in all classes of installation and maintenance work, including screwed conduit, Pyrotenax and trunking systems.

Applications, naming 2 referees to H. Lowe, M.I.E.E., Manager, Croydon District, SEEBoard. Electric House, Wellesley Rd, Croydon, by 22 Sept., 1954.

A. L. BURNELL,
Secretary.
(N 88)

ELECTRICAL AND MECHANICAL ENGINEER

required by BASRAH PORT DIRECTORATE, IRAQ, for one year in first instance. Salary equivalent to £1,200 rising to £1,440 a year. Provident Fund. Free passages. Liberal leave on full salary. Candidates. Graduates of the Institution of Electrical Engineers or equivalent must be experienced in the operation of medium-sized electricity undertakings and in erecting and maintenance of h.t. and l.t. overhead and underground systems, A.C. distribution systems and substation plant. Small diesel power station experience would be useful. Write to the Crown Agents, 4 Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience and quote M2C/30334/EE. (N 29)

ASSISTANT ELECTRICAL ENGINEER required for the Electrical Department of a large Industrial undertaking in the London area. Applicants should hold either Ordinary or Higher National Certificates or equivalent, and should have a knowledge of the design, operating and testing of Electrical Installation in factories including H.T. and L.T. Switchgear. Drawing office experience and the compiling of specifications and schedules, reports and estimating.

Apply giving full details of age, qualifications, experience and salary to—Box No. 3813, Electrical Times. (N 65)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2.

Appointments are available with THE ENGLISH ELECTRIC COMPANY LIMITED, on important work covering Application Engineering on all classes of electrical equipment. These appointments are pensionable after a qualifying period and apprentice trained men with Higher National Certificate in Electrical or Mechanical Engineering or equivalent, and with previous experience on Application work are preferred.

Experience in the manufacturing or power supply industries or in the application or installation of electrical equipment in any branch of industry or engineering is an alternative qualification and professional engineers in these fields are also invited to apply.

A number of vacancies also exist for apprentice trained engineers seeking an opportunity of acquiring Application Engineering experience. Reply stating age, experience, qualifications and quoting Ref. S.A. 33D to Dept. C.P.S., 336/7 Strand, W.C.2. (N 51p)

ALKALINE BATTERIES LTD., of Redditch, are the largest makers in the Empire of Alkaline accumulators, miners' lamps and emergency lighting systems, which are in rapidly growing use particularly for export. The company has vacancies in its Technical Sales and Development Sections for Graduate ELECTRICAL ENGINEERS, not over 30 years of age, or for men nearing the end of their Degree Course who have completed National Service. The posts are pensionable and offer the prospect of executive rank. Applications with full educational details and experience should be addressed to Commercial Manager, Alkaline Batteries Ltd., Union St, Redditch. (N 1)

A LEADING firm in the Lighting Industry requires TWO FIRST CLASS DESIGNERS for design work in their Fittings Department. Work will be concerned with special designs and new development and offers very attractive prospects and salaries for men with real initiative and a sound experience in this field. Applications should be addressed to the Staff Manager, Box No. 3805, giving full details of training, experience and qualifications. (N 45)

AN opportunity occurs in progressive manufacturing concern in London area for ENGINEER aged 25/35 with electrical or physicist degree, on development and research work on high frequency telecommunication cable and associated testing equipment. Salary will be commensurate with qualifications and experience. Apply giving full particulars to—Box No. 3811, Electrical Times. (N 64)

APPLICATIONS are invited for the post of TECHNICAL ENGINEER in the Sales Dept. of Messrs Igranic Electric Co., Ltd., Bedford (a Company in the Metal Industries Group). An O.N.C. in electrical engineering is a minimum requirement; practical experience in estimating and quoting for all types of A.C. and D.C. contactor equipment desirable, although training can be given to applicants having a suitable background. Age 25/35. Please apply in writing, stating age, qualifications, salary required, etc., to the Group Training and Personnel Officer, Metal Industries Limited, 60 Buckingham Palace Rd, London, S.W.1. (N 44)

APPLICATIONS are invited for RADIO AND TELEVISION SALESMAN-MECHANIC. Applicants must be able to service and maintain all types of Radio and TV Sets, and must possess qualifications of the recognised Trade bodies. No house available. Applications, in writing, stating age, experience, wages required (no overtime paid), with copies of recent testimonials to be sent to General Manager, Musselburgh and Fisherrow Co-operative Society Ltd., Musselburgh, not later than Wednesday, 15 Sept., 1954. (N 73)

ASSISTANT ELECTRICAL ENGINEER with experience F.H.P. motor design, for development work on motorised equipment for aircraft fuel systems. Qualification H.N.C. or equivalent. Apply, giving full particulars, to Self-Priming Pump and Engineering Co., Ltd., Trading Estate, Slough, Bucks. (N 54)

CHIEF ENGINEER required to commence duty as early as possible and to control Drawing Office, Development and Design. Must have technical and practical experience of Switchgear up to 11 kV and preferably some knowledge of Motor Control Gear. He must be a Member or Associate Member of the Institution of Electrical Engineers. Good permanent and progressive position for the right man. Pension scheme in operation. Apply by letter, marked personal, giving full particulars of experience, salary required, to Managing Director, Erskine, Heap and Co., Ltd., Lancashire Switchgear Works, Manchester 7. (N 39)

CONTRACTS ENGINEERS required for handling of switchgear tenders and contracts. Applications should state age, experience, qualifications and salary required and should be addressed to Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. (N 72)

DRAUGHTSMAN required for Electric Elements and Thermal Devices Manufacturers. Knowledge of presswork and press tool design an advantage. A distinct opportunity. House available if required. Five-day week. Pension Scheme, Canteen, etc. State briefly age, experience, technical training, salary, whether married with family, to—Works Manager, Best Products Ltd., Felixstowe, Suffolk. (N 41)

DRAUGHTSMAN required by The General Electric Co., Ltd., at their Head Office in Kingsway for work on airfield electrification schemes. Applicants should be in the age group 25/30 years and have had a technical education up to O.N.C., preferably H.N.C.—in electrical engineering. Apply in writing, quoting reference "BD" to the Staff Manager, Magnet House, Kingsway, W.C.2. (N 43)

ENGINEERS required for maintenance and design of electronic test equipment, quality control and investigational work on thermionic valves Inter B.SC., or Higher National Certificate standard. Apply giving full particulars of age, qualifications and experience to Personnel Superintendent, The Edison Swan Electric Co., Ltd., Cosmos Works, Brimsdown, Enfield, Middlesex. (N 97)

ELECTRICAL ENGINEER required (aged 30-40, preferably Chartered), to assume leading position — commanding equivalent £1,000 p.a. to start—in Design Office of London Company. Applicants must be fully conversant with low and medium voltage automatic contactor gear, motors, relay systems, and methods of temperature control. Previous D.O. experience and a thorough knowledge of wiring systems applied to precision machinery is essential. Write in first instance: Personnel Manager, Molins Machine Co., Ltd., Evelyn St, London, S.E.8. (N 7)

ELECTRICAL DRAUGHTSMAN required by the Steel Company of Wales Limited (Steel Division), Port Talbot.

Candidates should have experience in heavy industry and be capable of preparing drawings for electrical installation work, schematic diagrams, etc. A knowledge of lighting and communications would be an advantage.

Higher National Certificate or equivalent desirable.

Permanent and pensionable positions offered to suitable men with rates varying with age and qualifications.

Those wishing to apply should send full particulars of age, qualifications, experience, etc., to the Personnel Superintendent, The Steel Company of Wales Limited, P.O. Box No. 3, Port Talbot, Glam. (N 3)

ELECTRICAL DRAUGHTSMEN required for large Industrial Organisation in the London area. To have a knowledge of Electrical Circuits for power and lighting installations and Electrical plant layout for factories. Reply in the first instant stating education, age and salary required to—Box No. 3815, Electrical Times. (N 66)

ELECTRICAL ENGINEER, aged 23/28, with leanings towards commercial work, required by well-known porcelain insulator manufacturers in the Midlands. The successful applicant would receive training in H.T. Insulator Design Department and would be considered for subsequent transfer to Technical Sales. Starting salary £450/£750 p.a. according to age and qualifications. Apply—Box 3821, Electrical Times. (N 69)

ELECTRICAL ENGINEER required by Messrs Norman and Dawbarn, Architects and Consulting Engineers, 5 Gower St, London, W.C.1. Graduate, or corporate member of the Institution of Electrical Engineers with experience of industrial and domestic types of installation preferred. The work will involve the preparation of drawings, specifications and contract documents with some supervision of contract works. Write, stating age, qualifications, experience and salary required. (N 102)

ELECTRICAL FITTERS are required by the British Electricity Authority at their Nottingham Transmission Section. The nature of the work involved includes the overhaul of 132,000 V Transformers and switchgear at Transforming Stations within the Nottingham Section. Previous experience of H.V. apparatus would be an advantage. Rate of pay 45.00d. per hour, 44-hour week. Terms and conditions of service in accordance with N.J.I.C. Agreement. Applications in writing to Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham. Please quote Vacancy No. 109/54/ET. (N 95)

ELECTRICIAN FITTER wanted by East London firm. Man with tools and initiative. Able to work without supervision on plant maintenance and repairs. North country training an advantage. Apply—Box No. 3807, Electrical Times. (N 46)

ESTIMATING (SALES) CLERK (Male), aged 21/30 required. Good standard in maths and general education essential. Progressive, superannuation, sports. Permanency for right man. Apply Personnel Officer, Southern United Telephone Cables Ltd., Dagenham Dock. (N 63)

ELECTRICAL RESEARCH ASSISTANT. A large organisation in the North-West wishes to appoint a young man to evaluate the electrical properties of new insulation products.

Possession of Higher National Certificate in Electrical Engineering is desirable. Apply to—Box No. 3787, Electrical Times. (N 4)

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Please quote reference MDE. (N 55)

INSPECTOR required for inspection work in the electrical cable industry, Manchester area. Sound knowledge of mechanical engineering and/or draughtsmanship essential. A knowledge of electro-technology would be advantageous. Apply—Box No. 3817, Electrical Times. (N 67)

INSTALLATION AND MAINTENANCE ENGINEER for H.F. Equipment required by the General Electric Co., Ltd., at their Wembley Works. Applicants should have previous experience in this type of work and be prepared to travel in this country. Apply in writing giving full details and quoting reference "P.H." to the Staff Manager, Magnet Hse, Kingsway, London, W.C.2. (N 98)

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Applicants should state age, training and experience, together with salary required, to Employment Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, S.E.7. (N 38)

LABORATORY ENGINEER, H.N.C. or equivalent. Experience Magnetic Amplifiers and control circuits. Housing and Pension Scheme available. Apply Personnel Manager, Electro Methods Ltd., Caxton Way, Stevenage, Herts. (N 104)

LEADING OIL COMPANY require an ELECTRO-MECHANICAL DRAUGHTSMAN for design and detail work on experimental laboratory equipment at their Research Station near London. Applicants under 30 years of age. Must be in possession of Ordinary National Certificate and, if possible, should have had 2 years' workshop experience. Salary according to age, qualifications and experience. Pension Scheme. Write giving full details and quoting H.3156 to Box 6971, c/o 191 Gresham House, E.C.2. (N 103)

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REPRESENTATIVE required for electrical wholesalers. E.W.F., E.L.M.A., C.M.A., etc. Salary, commission and expenses. Apply, or telephone for appointment, giving details of experience, Managing Director, E. Dawson (Lamp Factors) Ltd., 10 Grays Inn Rd, London, W.C.1 (N 42)

SHIFT CHARGE ENGINEER for Electricity Supply Undertaking in Baghdad. Applications are invited from suitably qualified Engineers, preferably between 25 and 35 years of age, who have had experience in the operation of a power station of at least 15,000 kW, with medium pressure boilers. Salary £1,000 to £1,200 per annum, plus high cost of living allowance. Free house with heavy furniture will be supplied or a monthly house allowance of £12, in lieu.

Three year contract, renewable, with first class passage each way for successful applicant and family (if married). Three months' leave on full pay in U.K. on completion of 24 consecutive months in Iraq, first class leave passages being paid.—Box No. 3803, Electrical Times. (N 6)

SAO Paulo Light and Power Company Limited, a British company in Brazil, invite applications from suitably qualified men for the position of SHIFT CHARGE ENGINEER in the Piratininga Power Station. The power station, which has recently been completed and is presently commencing operation is situated near Sao Paulo (pop. 2·5 millions; temperate climate; 2,200 ft above sea level). The plant comprises initially 2 x 80 MW, 1,800 r.p.m. steam turbo-alternator units, each supplied at 850 p.s.i., 900° F by one 850,000 lb/hr oil-fired boiler. Applicants should have a sound technical knowledge and wide experience of the operation of modern turbines and boilers, preferably with oil or pulverised-fuel firing; should also have an aptitude for supervision and maintenance of harmonious labour relations. Good salary, three years' agreement subject to renewal with first class passage both ways; four months' paid leave after three years' service. Written application should be made to Mr W. P. Kellett, Joint Manager, Canadian-Brazilian Services Ltd., 148 Leadenhall St, London, E.C.3. (N 5)

SURVEYOR required for long term contract in Scotland. Must be conversant with Surveying and Profiling Overhead Line Routes. References required. Good salary and subsistence. Apply: B. French Ltd., Pike Mills, Green St, Kidderminster. (N 2)

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TECHNICAL REPRESENTATIVE required for Contractor engaged on cabling and industrial installations. Contacts with Electricity Boards, Consultants and large Industrialists essential. Permanent. Pension scheme. Write stating experience and salary required. Cable Jointers Ltd., 49 Avenue Rd, London, W.3. (N 96)

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PATENTS

THE proprietor of British Patent No. 603275, dated 5 Dec., 1945, entitled Improvements in Apparatus for Automatic Telephone Systems, offers same for license or otherwise to ensure its practical working in Great Britain. Inquiries to Singer, Stern and Carlberg, Chrysler Building, New York 17, N.Y., U.S.A. (N 53)

THE proprietor of British Patent No. 638105 entitled improvements in Current Limiter for Electrically Driven Machine Tools, offers same for licence or otherwise to ensure its practical working in Great Britain. Inquiries to Singer, Stern and Carlberg, Chrysler Building, New York 17, N.Y., U.S.A. (N 52)

THE proprietors of British Patent No. 653,009 dated 19 Mar., 1948, relating to "Improvements in or relating to Devices for Phase modulation of Electric Oscillations" are desirous of entering into an arrangement by way of a Licence or otherwise on reasonable terms for the purpose of exploiting the above Patent and ensuring its practical working in Great Britain.

All enquiries to be addressed to Heron Rogers and Company, Bridge House, 181 Queen Victoria St, London, E.C.4. (N 70)

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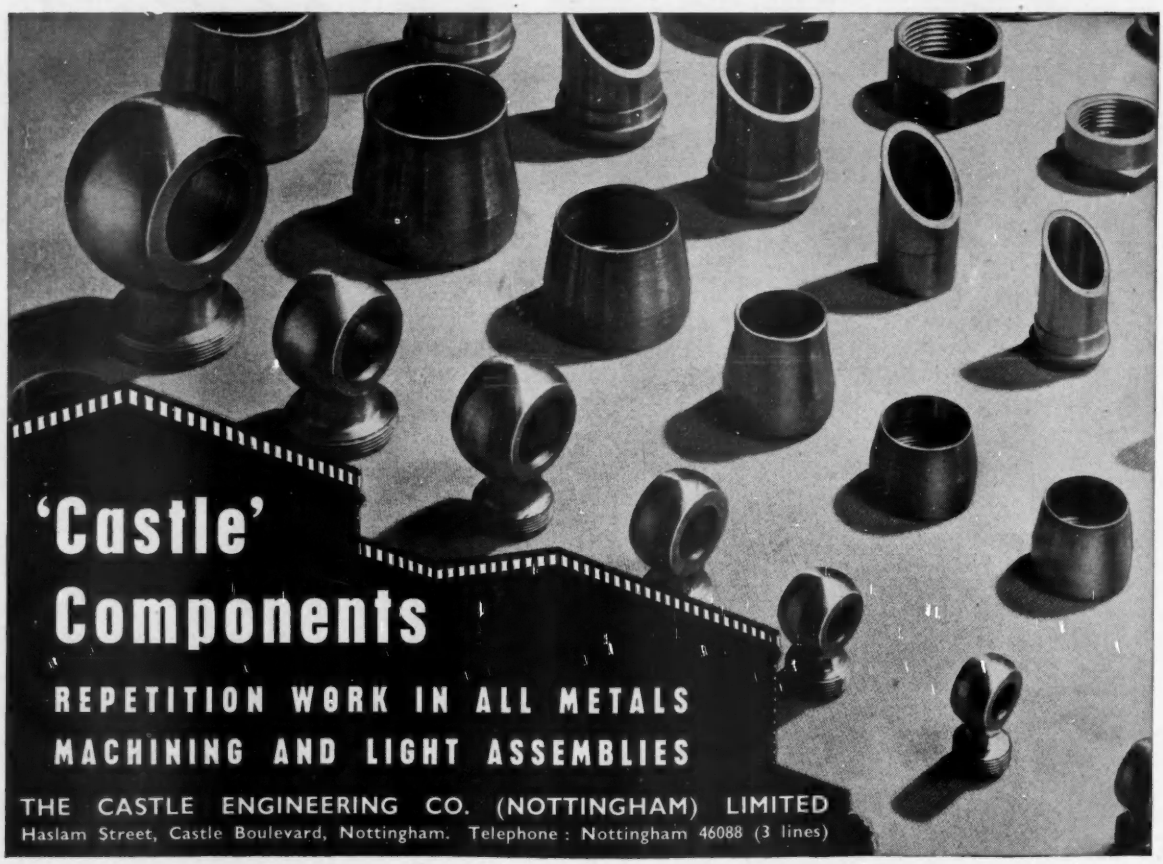
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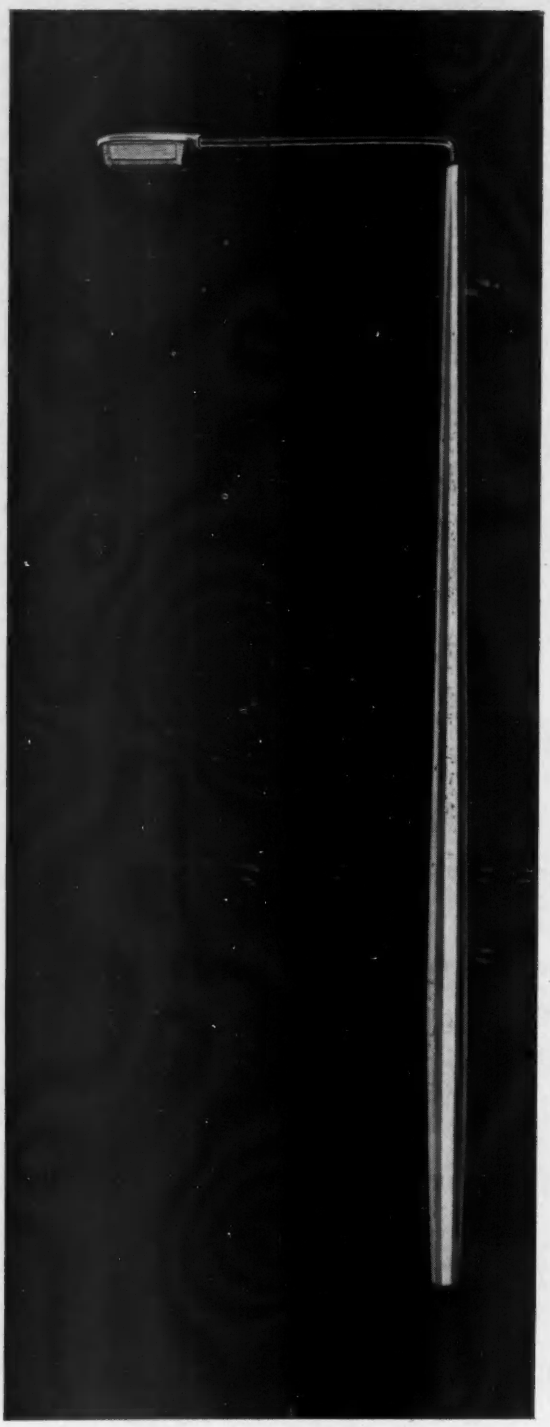

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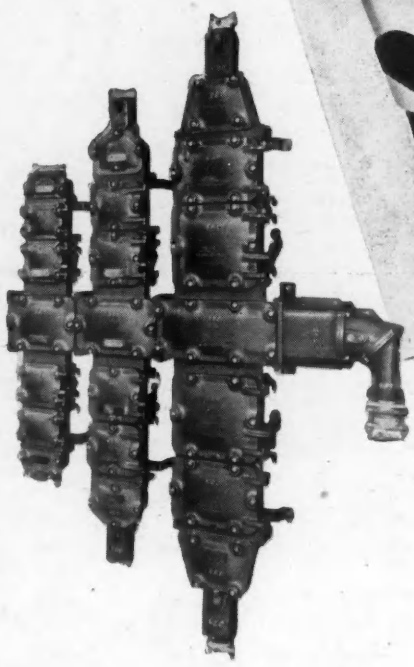

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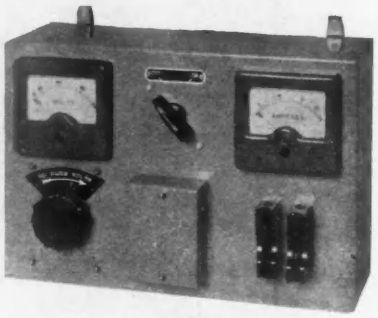

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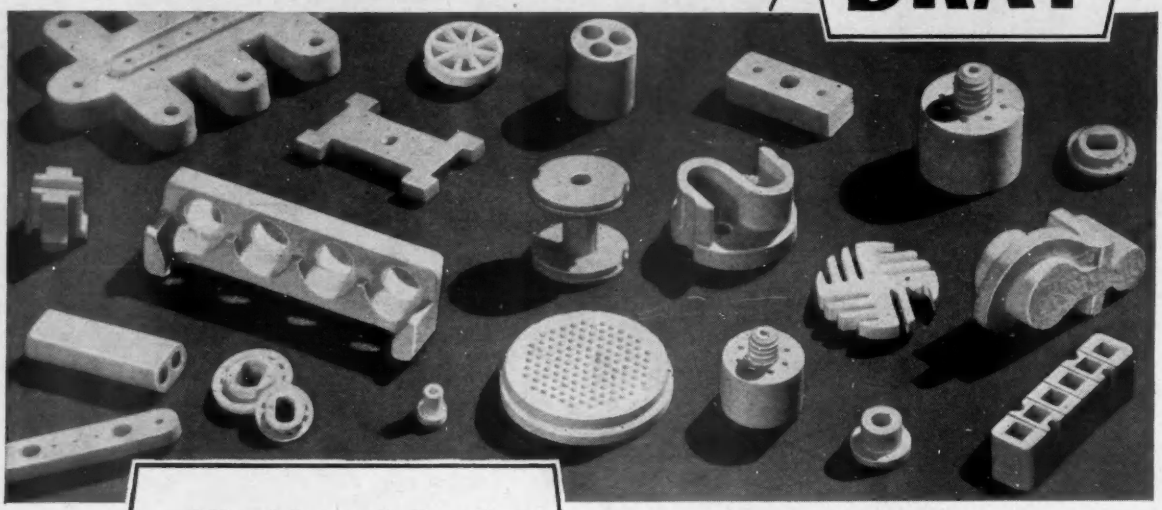

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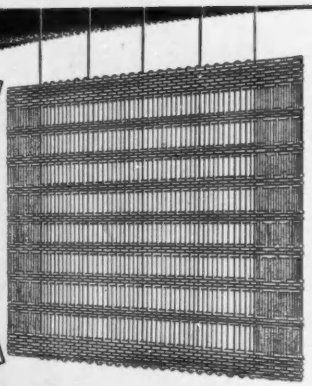

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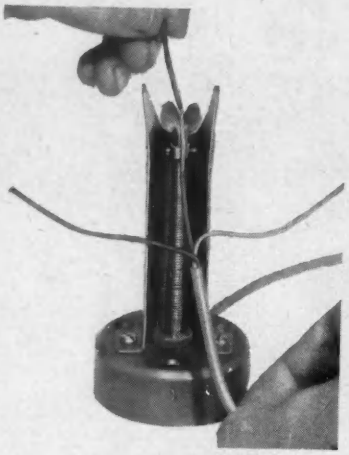

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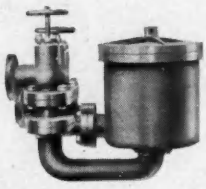

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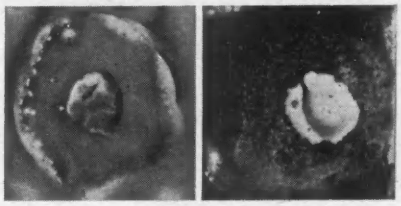

LEFT. Residue from Alcho-Re flux on soldered copper, shows no change *after three months' storage.*
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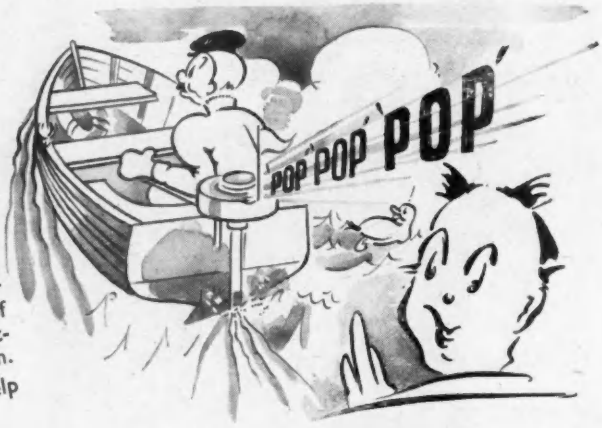

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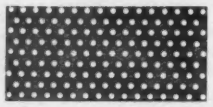

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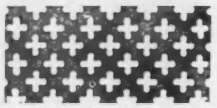

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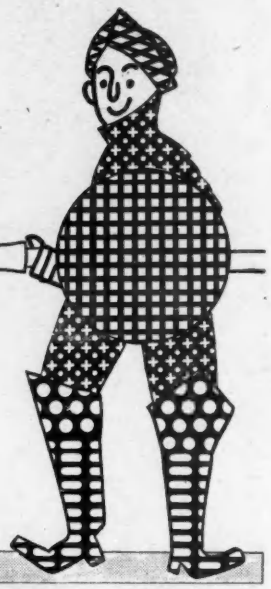

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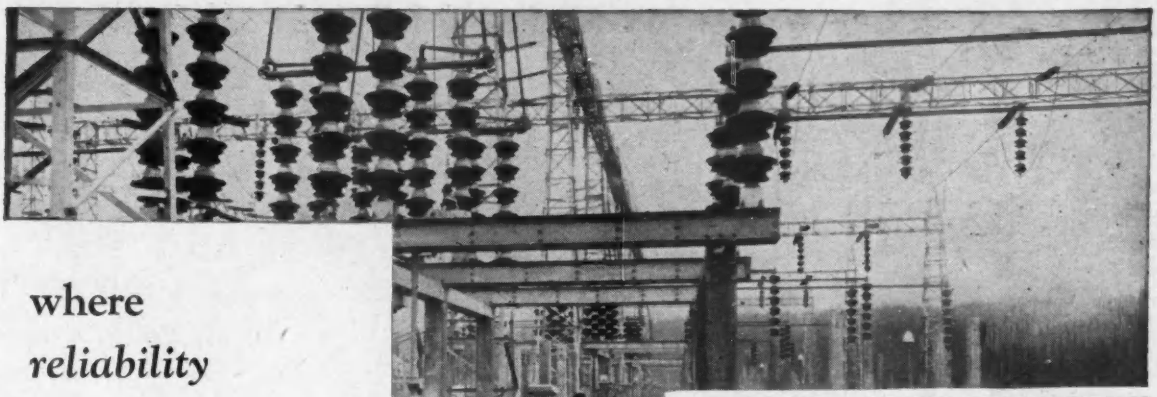

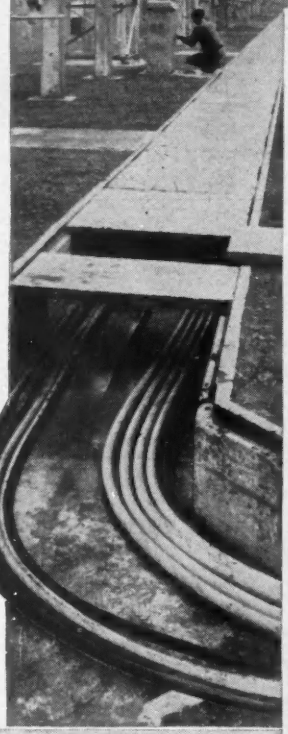

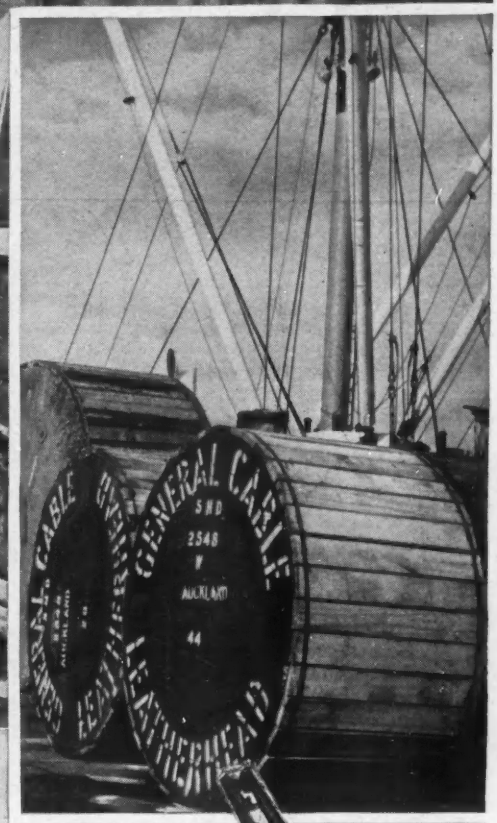

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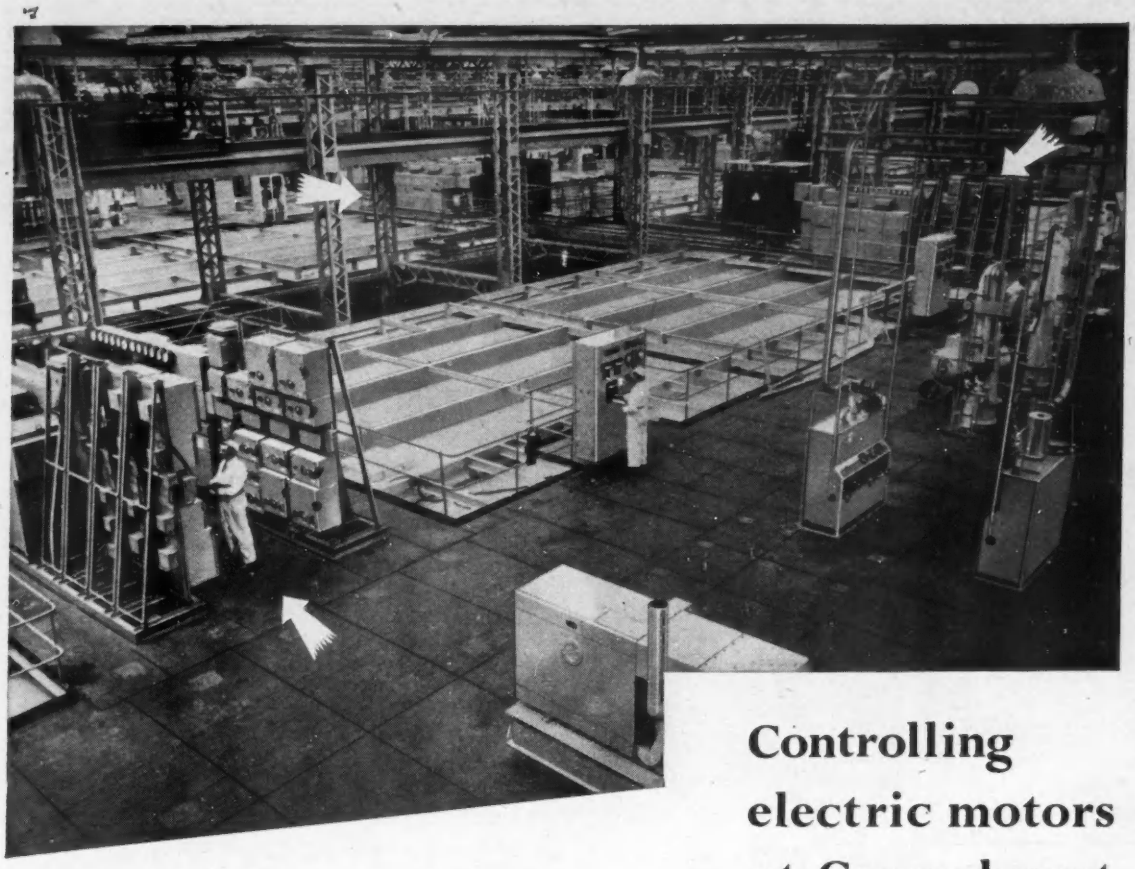

Controlling electric motors at Capenhurst Atomic Energy Factory

To the order of the Department of Atomic Energy, Industrial Group Headquarters, Brookhirst Switchgear Ltd. in association with A. Reyrolle & Co. Ltd. have supplied a very large number of motor control switchboards for installation at Capenhurst Works where Uranium 235 is processed by a gaseous diffusion plant. Part of the equipment is shown in the above illustration of one of the control decks.

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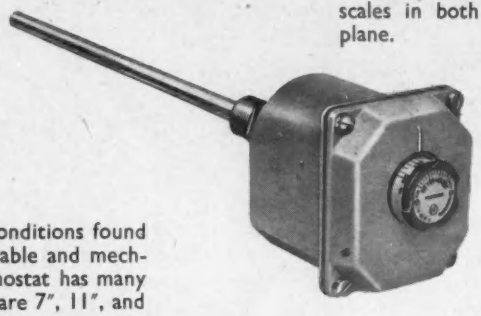

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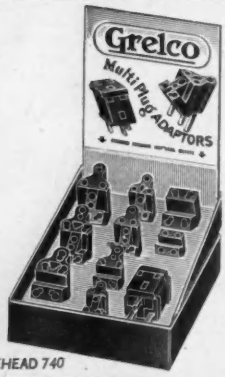

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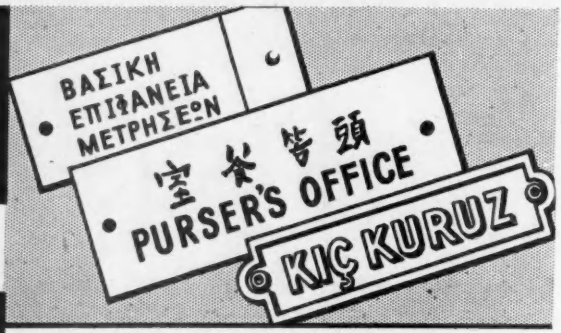

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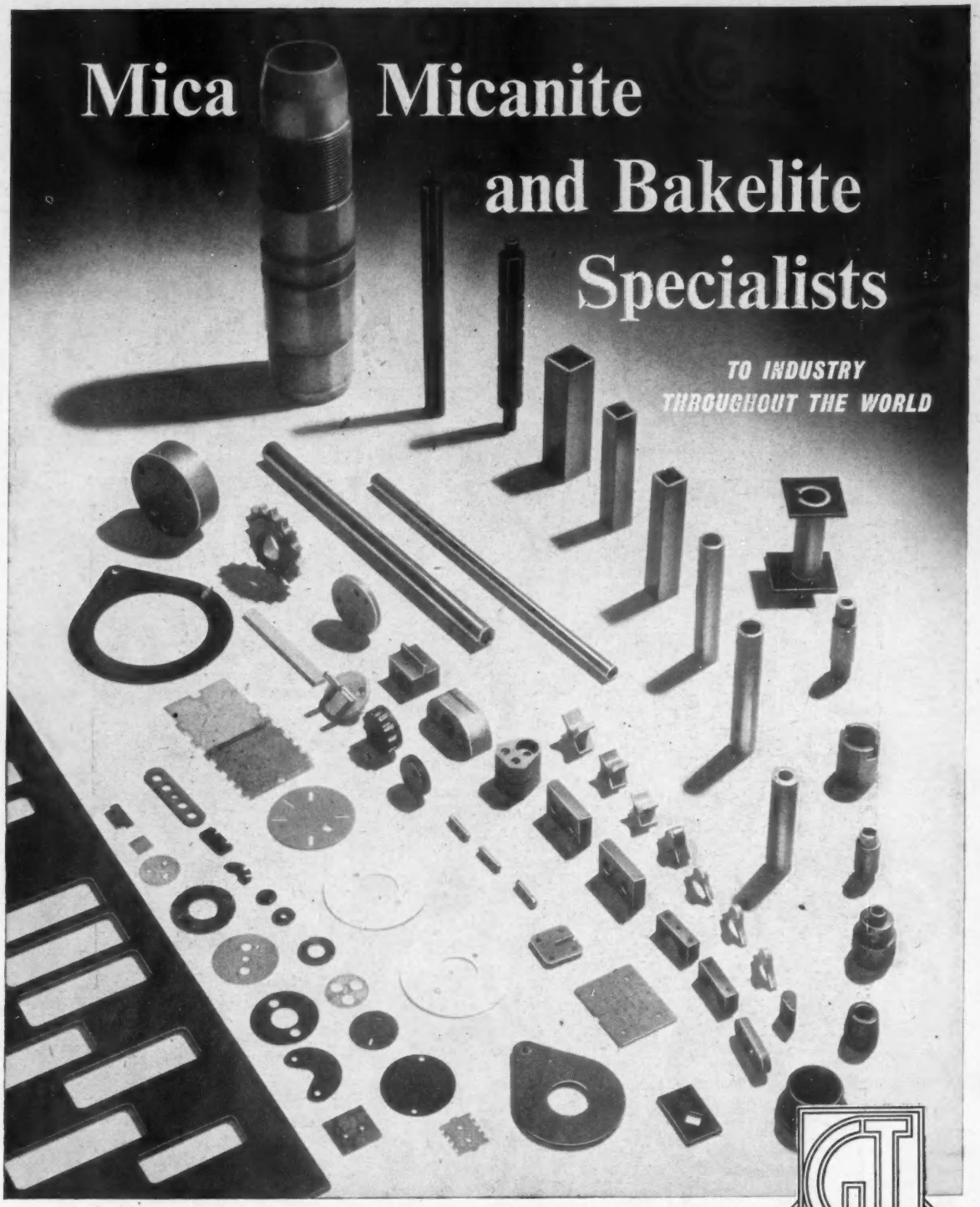

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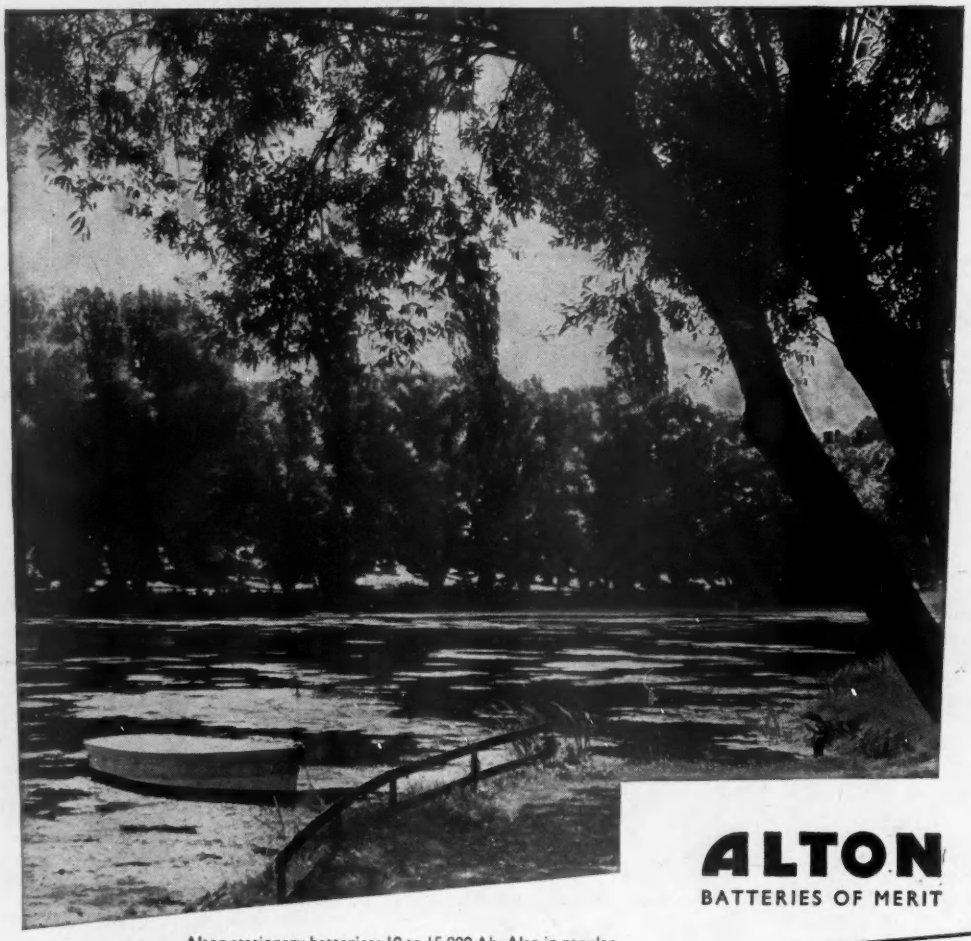

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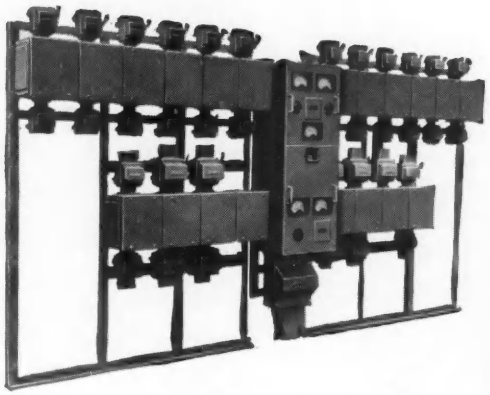

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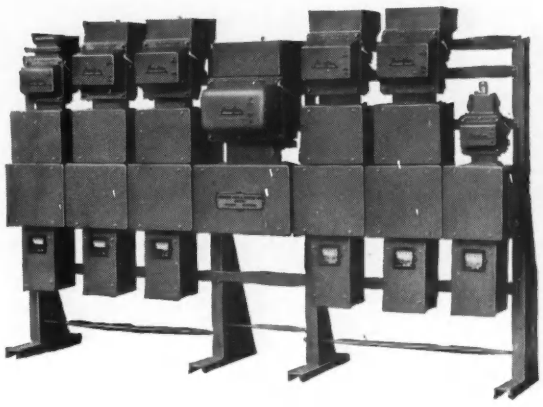

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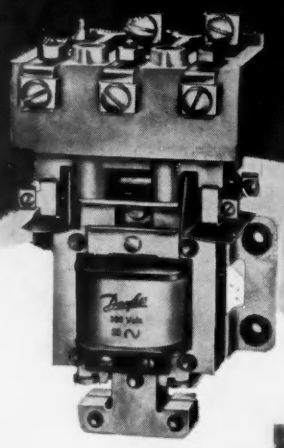

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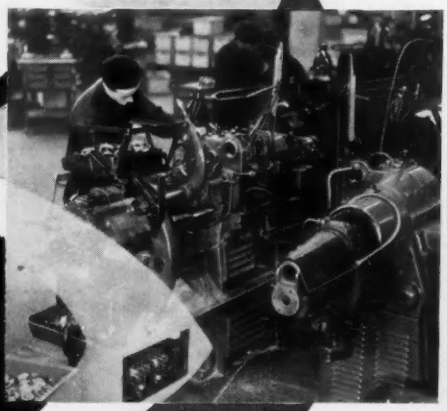

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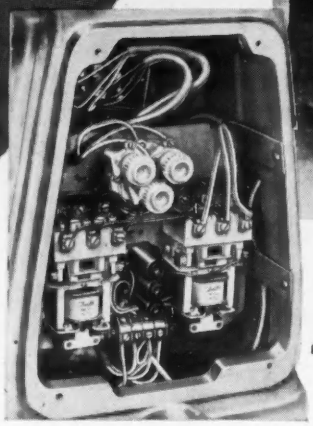

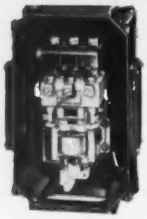

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